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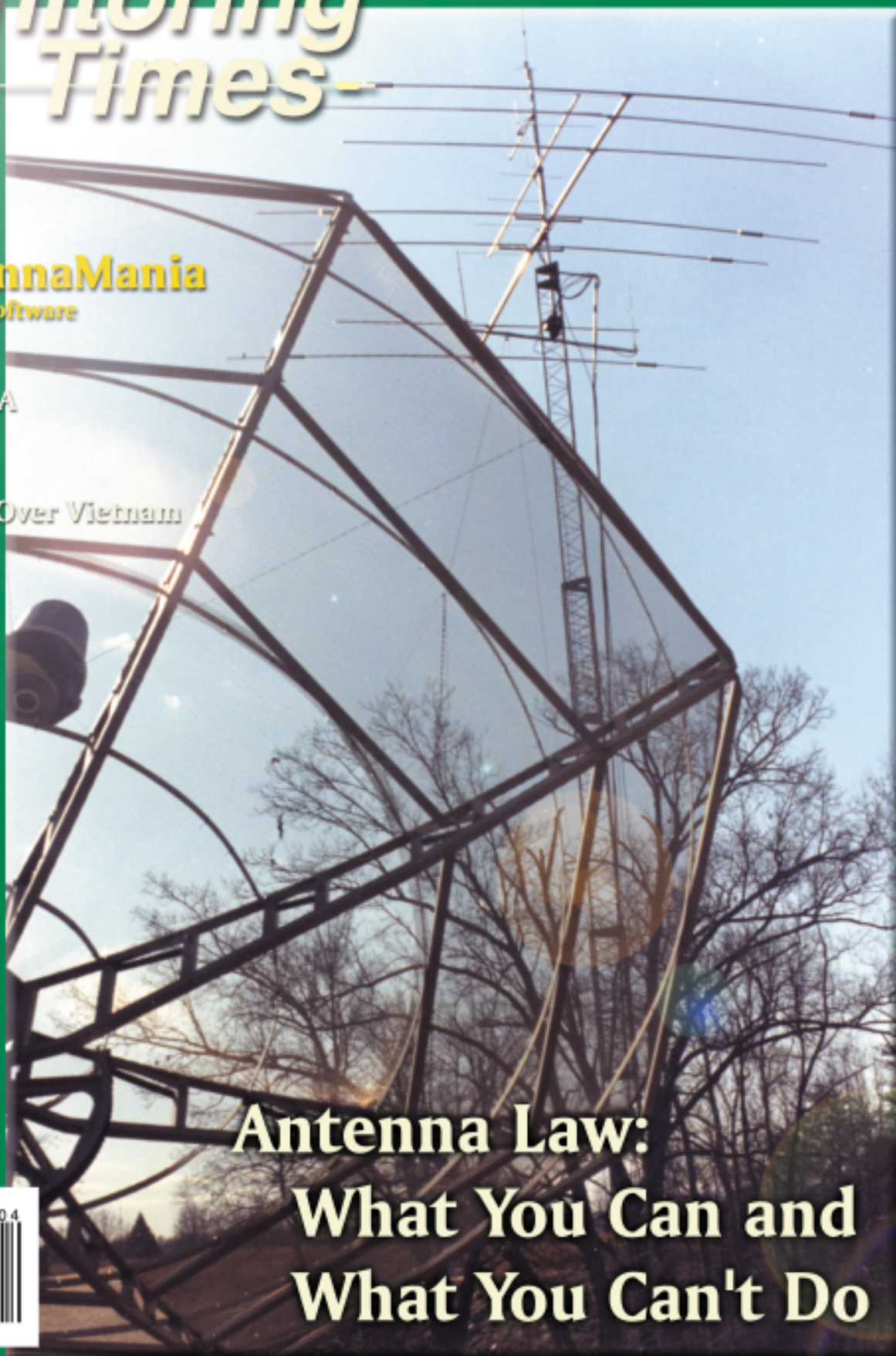
April AntennaMania

- Projects, reviews, software

- Crisis at the VOA

25 Years Ago

- The Radio War Over Vietnam



Antenna Law: What You Can and What You Can't Do



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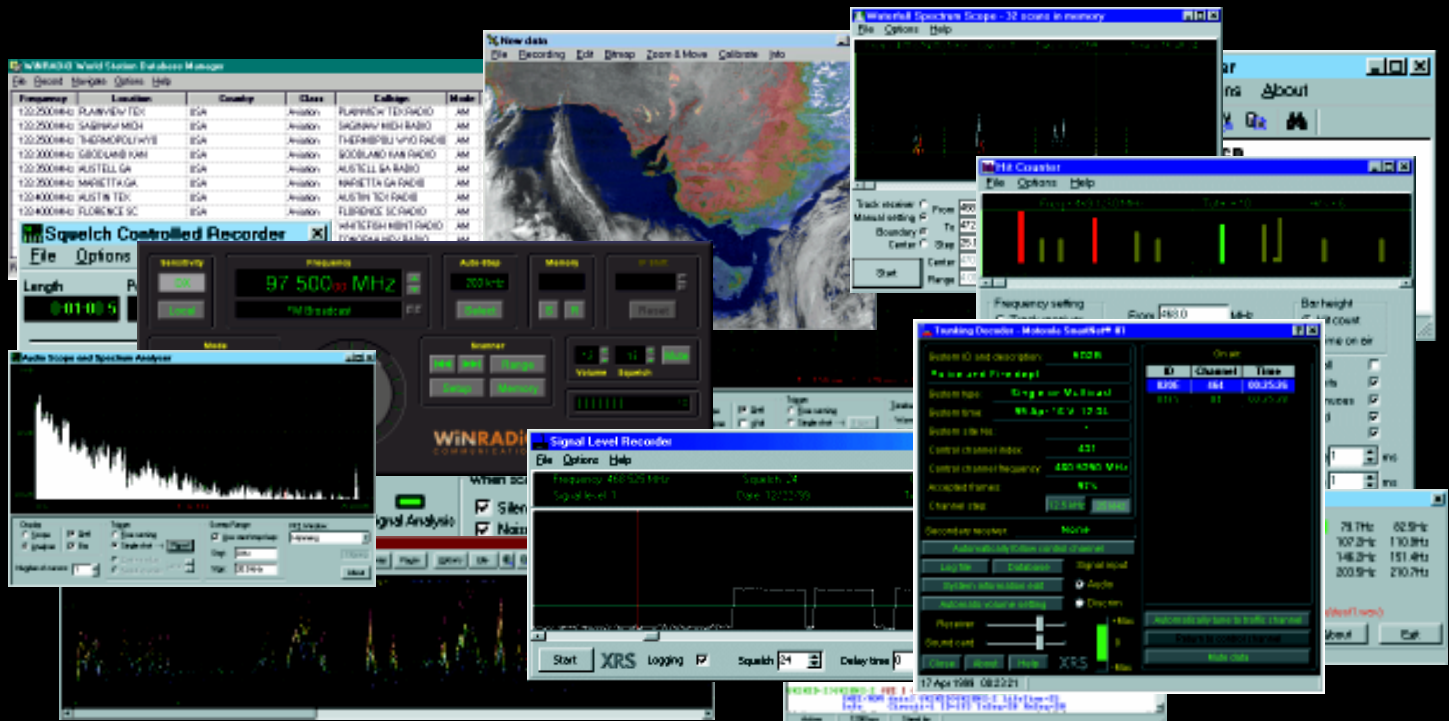
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Monitoring Times

Vol. 19, No. 4

April 2000

Cover Story

Antenna Law: What You Can and What You Can't Do

By Ken Reitz

Antennas are the heart of communications. Without them there's no transmission and no reception. And yet, one ham's dream could be a neighbor's nightmare. Thousands of towns and counties have set up obstacles to antennas. Former ARRL President Harry Dannals W2HD had to navigate some tricky legal waters to finally erect the installation on our cover.

The FCC has stepped in on the side of hams and satellite viewers, but there's no magic wand. And, what about shortwave or scanner hobbyists, or volunteers who need a taller antenna? What about restricted communities? This article gives radio and satellite hobbyists the good and the bad news.

Story starts on page 10. Cover photo by Jensen Montambault.

There are Antennas and There are Antennas!.....16

By Arthur Lee

The wind storm didn't seem to amount to much until the author heard a crash on the roof. He still managed to make a scheduled ham radio contact, even though the dipole was down. Surprising or hidden antennas that work is the topic.

The Queen of Communications (p. 18) is a companion article by Lee's daughter about her daughter – the new, third generation amateur operator.

Extending the Range of the Quad Loop.....20

By Richard Marris

By reader request, the author modifies his quadraform low frequency loop (see November 1999 MT), to extend its 120 to 220 kHz coverage up to 445 kHz.

The Radio War over Vietnam21

By Hans Johnson

Twenty-five years ago this month, the Second Indochina War was over with the fall of Saigon. The preceding years of struggle involved a battle that was fought on many fronts, including the airwaves. Does the name *Hanoi Hannah* ring a bell? How about *Voice of the Patriotic Militiamen's Front*? We take a look back at clandestine stations – white, black, and gray!

VOA Cuts European Services24

By Glenn Hauser

Congress allocated the VOA the same budget in 2000 as it did in 1999, when it was already overstaffed. With a mandated 4.8 cost of living raise, that equals a substantial cut in budget. Following the Broadcasting Board of Governors' language service review, 51 positions are to be cut – from some rather surprising services.

Reviews:

This month's top pick is **Pryme's PR-460 GMRS** handi-talkie (p.94), which combines simplicity of operation with great performance – "the best GMRS radios I have ever tested," says Jock Elliott.

Equally high praise is won by an active loop antenna newly available in North America – the **Wellbrook Communications ALA 1530 loop**. "This is the first time that I've felt a small, easily installed antenna could fill most of my HF and LF needs," says reviewer Jacques d'Avignon (p.96).

continued on next page





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Reviews cont.

For homebrew antennas, you'll want to check out the software antenna design programs reviewed by Clem Small on p.90.

With the new FCC ruling on low power FM licensing, we predict renewed interest in products like the **Ramsey Electronics FM-100 Stereo Transmitter kit**, reviewed on p. 103.

What is intermod and why is it important in choosing a new scanner? Parnass compares the performance of several of the most popular scanners (p.98). Using a **Palm Pilot**, Catalano tries out **DeLorme's Street Atlas**, which, when used with **Solus Pro** and **Earthmate**

GPS receiver, can guide you wherever you want to go; using **3D TopoQuads** you can even get a fascinating 3-dimen-
sional look at your location (p.104).

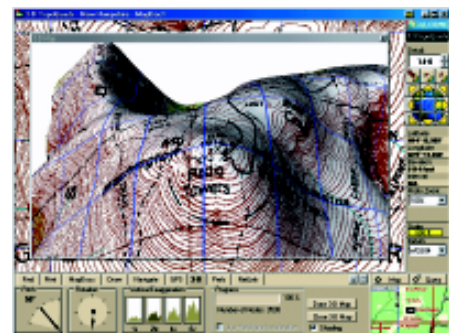


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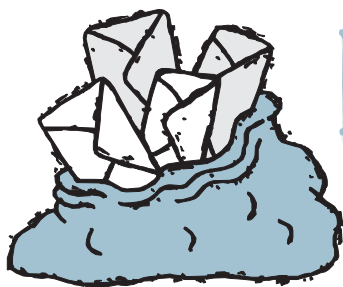
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LETTERS TO THE EDITOR



The official groundbreaking Feb 6, 2000, for APCO's new headquarters facility in South Daytona, Florida. (L-R) Barry Morris, KD6ZZZ, Kenwood; Joe Gallelli, The Gallelli Group (and a past President of APCO); John Ramsey, Executive Director, APCO; Gary Oldham, Lucent Technologies (in 2nd row, with my head obscuring part of APCO's logo); Lyle Gallagher, APCO President elect; Joe Hanna, APCO President; Glen Nash, APCO 1st Vice President; Thera Bradshaw, APCO 2nd Vice President; Don Whitney, K9DRW, Motorola; Rick Ringold, Concept Seating.

Apologies to APCO

Maybe it was a "senior moment" or a brain glitch from using a cellphone too often (actually, I don't use one, so it must have been the former!); I thoroughly embarrassed myself in the February *Communications* column in which the acronym APCO was said to stand for "Association of Police Commissioners Association"! As reader Gary Oldham points out, it doesn't even make sense. He also provides some interesting background on the past and present status of this dedicated organization.

"... the arguably premier association dealing with public safety communications is the 'Association of Public Safety Communications Officials, Inc.' The missing 'S' in the acronym is a legacy of APCO's earlier days, when the acronym stood for the Association of Police Communications Officers. APCO itself is an outgrowth of the California Police Radio Association, started by, among others, the Pasadena Police Department. In fact, the Southern California chapter of APCO maintains CPRA as it's name/acronym (standing for the California Public (Safety) Radio Association.)

"APCO will be holding its 66th annual conference in Boston this August, and that fact alone is suggestive of APCO's long history in public safety communications. ...Editorial mistakes hap-

pen, but please, let's show respect to this organization that has done so much for public safety communications; our hobby; and the livelihoods of so many."

— Gary Oldham

Electron Velocity Revisited

"In our February *Letters* column, we referred to the velocity of current in a conductor. I oversimplified, as several astute readers pointed out. While I was correct in stating that an *electromagnetic signal voltage* may propagate through coax at nearly the speed of light, I was wrong in assuming that electrons were moving through the length of the conductor at the same speed. They aren't.

"In a conductor like copper, the outermost (valence) electrons surrounding the atom are randomly shifting position among fellow atoms (instantaneous velocity) at nearly the speed of light. But they don't move all that fast down through the length of the conductor — in fact, even as an electromagnetic signal is rushing through at nearly the speed of

light, the actual drift velocity of the electrons from end to end is only about 3 inches per hour!

"Thanks to Jack Smith K8ZOA, Ralph Muha, John Henning, Derick Ovenall and others who correctly brought this to my attention."

— Bob Grove

Keeping Up with AM

The mediumwave broadcast band is notorious for its constant turnover; keeping up is a challenge, and other hobbyists and the FCC website are of great help. Here are few comments from hobbyists to the February article, *DXing the AM Band*.

"I enjoyed your article in Feb. *MT* on the broadcast band, but I must offer one correction! WCAU in Philadelphia, Pennsylvania, is now and has been for several years, WPHT. It seems that several years ago the honchos at CBS thought nothing of dropping the venerable WCAU in favor of the new call for some unknown reason."

— Jim K3RTU

"I remember my parents and I listening on their Midwest Console every Saturday night to the Grand Ole Opry over WSM. We were in Columbus, Ohio. I remember hearing Detroit, New York, Chicago, etc. and thought it was great.

"One thing I wanted to mention. The listing for KOKK Huron, South Dakota on 1210, what is their nighttime power? What was printed

certainly can't be correct. Thanks."

— Michael C. McCarty, W14NDS

Nighttime power was listed as .900 kW, which the author says is correct. Glenn Hauser also added that DC WMAL is 630 not 620; FL WTIR is 1680 not 1670; and ND KFYZ is spelled Bismarck not Bismark.

"As the Crow Flies" Is Longer

Here's a correction to the March feature, *How Far is Line of Sight?* "May I gently take issue with the statement on page 20 that 'nautical miles are about 15% shorter than statute miles'?"

"In fact, the reverse is true. The statute mile is 1760 yards, i.e., 5280 feet (or 1,609 kilometers). The international nautical mile is 6,076.12 feet, or 1.852 kilometers, i.e. about 15% more, not less than, the statute mile.

"Your author may have been thinking in terms of how many miles are needed to express a given distance, where fewer nautical miles are applicable compared to statute miles in numerical terms. Thus 100 nautical miles is about the same actual distance as 115 statute miles."

— David Robinson

Jacques d'Avignon also pointed out above correction ... and that the author's statement that "the best I have done ... is about 290 nautical miles (251 statute miles)" should read 290 statute and 251 nautical miles. Jacques also suggested the figure for the radius of the Earth should have been supplied for the distance calculation. Our references give the mean radius as approximately 6371 km, 3950 statute miles, or 3440 nautical miles.

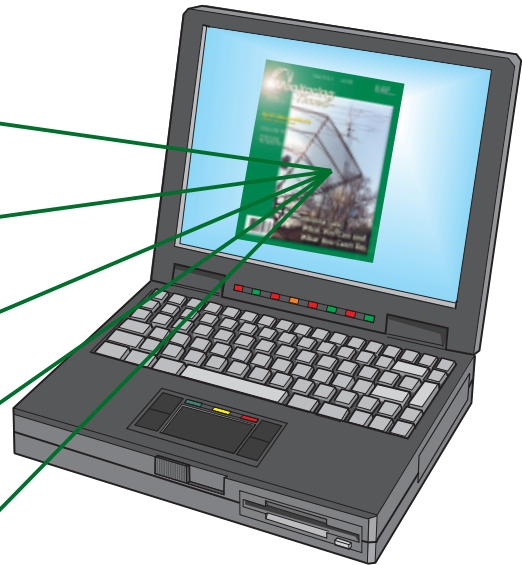
Psst! These frequencies are secret. Pass It on...

Larry Van Horn received the following email from Royce Shearing of the Bureau of Land Management following publication of the February issue: "In your article, *The Fed Files: A Guide to Government Communications* where you talk about the National Interagency Fire Center I have a question. Who gave you permission to publish the NIFC Frequencies. They are FOIA exempt and not to be put into public documents. We also have not gone to narrowbanding and that info is wrong."

The information we published is widely available in the public domain on the internet, in *Police Call*, and elsewhere, says Larry; many frequencies were also verified through monitoring a very active local fire season in 1999. On the frequency list it was noted that the mode used is narrowband FM mode (as opposed to wideband). This is not a reference to the new reduced bandwidths.

continued on page 95

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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@texas.net

FCC Creates Low Power FM Broadcast Radio Service

Get ready for a new group of alternative music, religious, local government and educational programming that could be on the FM broadcast dial as early as this summer ...and headquartered right in your neighborhood.

The FCC voted 4-1 on January 20th to create a new class of low-tech FM broadcast stations designed to "...serve very localized communities or underrepresented groups within communities" by authorizing two new classes of noncommercial low power FM (LPFM) radio services (*Mass Media Docket No. MM- 99-25.*)

The driving force behind the proceeding are complaints from small communities, churches and other local organizations who say they are prevented from airing their views by the massive consolidation of commercial radio stations. Former limits on station ownership were lifted by Congress in 1996, leaving companies free to amass hundreds or thousands of radio stations. As of the end of last year, the top 10 broadcasters controlled 2,000 stations ...more than triple that of just three years earlier.

The original LPFM proposal

In an effort to help regular FM stations grow and become financially viable, the FCC stopped licensing low-powered FM radio stations around 1978. A year ago the Commission proposed to license two new low power FM stations at 100 and 1000 watts. In addition, the FCC wanted to know if they should license "microradio" stations that would run 10 watts or less.

The proposal was based on two *Petitions for Rulemaking* filed by two Extra Class ham operators. Nickolaus Leggett N3NL of Reston, Virginia, wanted the FCC to adopt a "*Microstation Radio Service*" which would permit low power broadcast stations on both the AM and FM broadcast band. He said it would help "...energize" small geographic, political or cultural communities.

Rodger Skinner W4FM of Pompano Beach, Florida, asked for three new types of Low Power FM broadcast stations: a special event class (LPFM-3), small community 50-watt class (LPFM-2) and a higher powered – up to 3 kilowatt – (LPFM-1) "structured type" of station with local owners.

The FCC said the proposed one thousand watt stations would reach an audience up to ten miles away, 100 watt stations would have a range of 3.5 miles and 1 to 10 watt stations – if adopted – would serve areas 1 to 2 miles from the transmitter. LPFM stations must be noncommercial.

LPFM is largely a campaign of William Kennard, the FCC's first African-American Chairman and a frequent critic of consolidation in the broadcast industry. "We all know that as more and more stations become concentrated in fewer and fewer hands, there are fewer opportunities for people who want to use the airwaves to speak to their communities," Kennard said.

FCC scales down low power broadcasting

When the dust cleared from what was a very contentious public comment period, the FCC selected only two new classes of non-commercial low-power stations with power levels of 1 to 10 watts (LP10) and 50 to 100 watts

(LP100). The threat of interference persuaded the FCC to back away from the possibility of 1,000 watt stations.

The Commission also adopted interference protection requirements based on distance separation between stations to guard against interference to existing FM stations and to not inhibit the ability of existing radio stations to transition to *In Band-On Channel* (IBOC) digital transmissions in the future.

Those eligible to obtain LPFM licenses include noncommercial government or private educational organizations, associations or groups; non-profit entities with educational purposes; or government or non-profit organizations providing local public safety or transportation services. LPFM licenses will be awarded throughout the FM radio band and will not be limited to the channels reserved for use by noncommercial educational radio stations.

To further its goals of diversity and creating opportunities for new voices, no existing broadcaster or other media entity can have an ownership interest, or enter into any program or operating agreement, with any LPFM Station. LPFM stations are being encouraged to originate local programming and will be prohibited from operating as station translators.

During the first two years, LPFM licensees may only operate one station and must be located within 10 miles of the station. LPFM stations will be licensed for eight-year, renewable terms and these licenses will not be transferable. Four-letter call signs will be assigned with the letters LP appended.

Applications will be accepted in designated five-day filing windows. The first filing window to be opened will be for LP100 licenses. The FCC believes a filing window system is preferable to a first-come/first-serve filing system which might disadvantage some potential applicants.

The *Communications Act* exempts noncommercial services from the auction requirement; that is, being sold a license. The FCC will decide cases where there are multiple applicants for one license using a selection process that awards local applicants points for operating at least 12 hours daily and originating local programming. Applicants with the same number of points may be able to share on-the-air time or may be awarded successive one year non-renewable license terms.

Eligible licensees will be subject to the same character qualifications as are currently applied to full power licensees. "Pirate" FM radio stations that have broadcasted without a license in the past may apply for LPFM licenses if they certify:

- 1) that they had voluntarily ceased engaging in unlicensed operations no later than February 26, 1999, without specific direction from the FCC, or
- 2) that they had ceased engaging in unlicensed operations within 24 hours of being advised by the Commission to do so.

"Pirate" stations who continued illegal broadcasting will be ineligible for any broadcast license.

LPFM stations will be required to broadcast a minimum of 36 hours per week, will be subject to various statutory rules, such as sponsorship identification, political programming, prohibitions of airing obscene or indecent programming, and requirements to provide periodic call sign

announcements, and must participate in the national *Emergency Alert System* (EAS).

Up to 1000 new LPFM stations

The FCC believes that up to a thousand new low power stations can be sandwiched into the current FM band without causing interference. Licenses will be non-transferable and local ownership is required for the first two years.

But as FCC Commissioner Harold Furchtgott-Roth pointed out, "...there will be precious few new licensees in urban markets." Major cities like New York, Los Angeles, Chicago, Philadelphia, San Diego, Dallas, San Francisco, Washington, Charlotte, and Miami will only get new 10 watt stations since there is no spectrum there for 100-watt stations. But there is room for dozens of 100 watt stations in most less dense areas.

LP-10 stations have a range of about 1 or 2 miles from the antenna while LP-100 could reach a community up to 3.5 miles away. The low-power stations also cost many times less than the average FM broadcast station operating at 6,000 to 100,000 watts. For one thing, they can mount their antennas on top of a building rather than constructing an expensive, free-standing tower.

The pros and cons of LPFM

Calling it a "...sad day for radio listeners," Eddie Fritts, president of the *National Association of Broadcasters* charged the FCC with choosing "social engineering" over responsible

spectrum management. "Thousands of people won't be able to hear their hometown radio stations because of this."


FCC Chairman William Kennard does not agree with the interference theory. He said LPFM has had thorough testing and analysis and that low-power FM stations will have a minimal impact on commercial broadcasters.

To say that existing FM stations are not pleased with the LPFM result is an understatement. They *publicly* say the new LPFMs will interfere with existing nearby stations. And at least one FCC Commissioner agrees.

FCC Commissioner Harold Furchtgott-Roth labeled the LPFM concept as "...entirely irresponsible." He said "...this entire proceeding has been marked by a rush to judgment. The Commission has simply not taken the time to do the right technical studies, the right way."


But low power advocates say the real reason for dissatisfaction among the broadcast industry is they don't want competition for the local listener where audience ratings determine their future.

The FCC is likely to begin accepting applications in the spring and will issue a *Public Notice* 30 days before accepting any applications.




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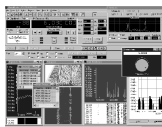


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- PDL-ARQ 160 Baud
- Duplex ARQ
- TDM342/ARQ-M24-M24-342
- TDM342/ARQ-M24
- FEC-A
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- FEC-S = FEC1000
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April 2000

MONITORING TIMES

7

New BBC Schedules in April

The BBC's March *On-Air* magazine alerted listeners that beginning in April BBC World Service programs will be organized to suit the local time in most parts of the world and help end the confusing program changes that occur twice a year.

News programs will be arranged so that wherever you are listening you can get a comprehensive briefing in the early morning, at lunchtime and in the evening. Science, features, music, etc. will be grouped in two or three hour blocks in the mornings, afternoons and evenings and scheduled consistently.

If you can't find your favorite program, this could be why. Program details were not available at *MT*'s press time.

Spy versus Spy

In Brussels, the European parliament is considering allegations that American and British intelligence have been eavesdropping illegally on European companies and that U.S. companies have benefitted from the information. In France, the US and British espionage agencies are facing legal action over similar claims.

Former French interior minister Charles Pasqua has accused Britain of "shocking" behavior in working with the United States in an electronic surveillance system known as Echelon. The Echelon program is reported to use satellites and ground stations in the United States, Britain, Canada, Australia and New Zealand as well as in Germany and Japan to monitor communications around the world.

The system, which tracks telephone calls, faxes and e-mails, was originally set up during the Cold War for military surveillance, but has been used more during the past decade for industrial espionage, Pasqua said. An 18-page report written by freelance journalist Duncan Campbell, and based in large part on other newspaper accounts, also claimed Echelon had been used by the United States to gain the advantage in at least two deals that involved major European companies.

On the other hand, the *Sunday Times* of London has reported that French intelligence services routinely monitor British GSM calls from at least eight centers scattered across France, which are "aiming" their receivers at "British defense firms, petroleum companies and other commercial targets." Information then is passed on to private and government agencies. The newspaper hints the British government and relevant defense company senior managers are well aware of the problem, and they are being told not to discuss sensitive matters on their handsets.

Surveillance at Home

The Center for Telecommunications Industry Association, the Center for Democracy and Technology and the U.S. Telecom Association joined the Electronic Privacy Information Center, the

Electronic Frontier Foundation and the American Civil Liberties Union in filing briefs challenging a Federal Communications Commission order requiring the industry to adapt its systems to support extensive police surveillance capabilities. The groups say the FCC expanded the scope of the Communications Assistance for Law Enforcement Act (CALEA) following pressure from the Federal Bureau of Investigation, going far beyond congressional mandates.

According to CTIA, "The FCC's order is full of holes that enable a successful legal challenge. The agency exceeded the authority given to it by Congress, neglected its duty to explain its decisions sensibly, and clearly misinterpreted

CALEA." The groups hope the court will reverse the decision in May.

The Human Side of Scanning

Get your hands on a scanner, cellular phone, computer or any other new device and how you use it reveals much about your character. Here's a little slice of life:

- In Varney, West Virginia, local residents listening to their scanners helped locate and identify a man charged with robbing a convenience store.
- In Robbinsville, North Carolina (not far from *MT* headquarters), a pilot crashed-landed his



(See www.grove-ent.com/hmpgmt.html for more events and club info)

April 1: Warwick, NY

WTBQ-1110 DX test from 5:15 - 6:00 am EST. Novelty music and code IDs. Send reports to: Mr. Rob McLean, WTBQ-AM, 62 N. Main St., Florida, NY 10921, am1110@magiccarnet.com or www.wtbq.com (Arranged by Rob McLean of WTBQ.)

April 2: Hamilton Twp, NJ

Hamcomp 2000 by Delaware Valley RA at Tall Cedars of Lebanon picnic grove on Sawmill Rd, 8a.m.; adm \$6. Talk-in 146.67 (-). For more info www.slac.com/w2zq or 609-882-2240. Hamcomp 2000, DVRA, PO Box 7024, West Trenton, NJ 08628.

April 14-15: Marietta Georgia

Fourth Annual Southeastern VHF Society Conference, Atlanta Marriott Northwest (800-228-9290), 8a.m. Fri through Sat banquet (Joel Harrison W5ZN speaker). Preamp and antenna gain measurements, technical papers, vendors, flea market. \$40 registration + \$35 banquet. Contact SVHFS, PO Box 1255, Cornelia, GA 30531; Dick Hanson K5AND@ga.prestige.net, 770-844-7002.

April 29: Moulton, Alabama

Third Annual "The Best Little Hamfest in Alabama" © by Bankhead ARC at H. A. Alexander Park, 1 Mi W of Moulton on Court St, 9am-4pm; Talk-in 53.17, 146.96, 442.425; adm \$4. VEC Testing, concessions, prizes. For more info: Bankhead Amateur Radio Club, Inc., 215 County Road 599, Moulton, AL 35650, Lee Kreuzer 256-351-7916, n8mhc1@cs.com or visit www.n4idx.org

RADIO ROMANIA CONTEST

Answer these questions and you could win a 10-day trip for two to the foothills of the Carpathian mountains in Romania! Mention a) at least three events or personalities of the second millennium that brought Romania to the center of international attention; b) three Romanian spiritual centers, institutions or sites; c) the year when Pope John Paul II visited Romania.

Send your answers to Radio Romania international, 60 - 64, G-ral Berthelot Street, Bucharest, Romania or to their e-mail address: engl@rri.ro

CLUB NEWS

Most clubs now have e-mail reflectors that are open to any hobbyist interested in the topic. Here are some that recently came to my attention:

Worldwide TV-FM DX Association - WTFDA-subscribe@topica.com (no text in body)

National Radio Club/DX Audio Service - am-request@nrcdxas.org (subscribe [your email] in body)

Electronic DX Press - electronic-dx-press-subscribe@eGroups.com. EDXP is an electronic newsletter covering shortwave broadcasting originating in or beamed to Asia, the Far East, the Pacific, Siberia, and Indian sub-continent. Contact Bob Padula <BPadula@compuserve.com> for more information.

Ontario DX Association - odxa-subscribe@eGroups.com. Other ODXA news: The monthly magazine has changed its name from *DX Ontario* to the more inclusive *Listening In*. A taped version, *Listening In On Tape* (the 12th year of this service) can be requested in place of the printed magazine. www.odxa.on.ca, odxa@compuserve.com or 416-297-0449

If you don't want to download dozens of messages from an email reflector, check out the **Monitoring Times Chat Board!** Go to www.grove-ent.com and open up only those messages you want to read. Posting is painless, too!

plane in the remote mountains of North Carolina. The pilot was able to notify emergency agencies of his location using a cellphone and the plane's GPS positioning system, but his real stroke of luck was a scanner listener: a computer expert who just happened to be working on a county mapping project.

Even knowing the pilot's position within a quarter-mile, it was a difficult and dangerous nighttime rescue in below-freezing weather. Without the help of GPS and radios, it is doubtful either the pilot or his plane would have been found in this "little mountain version of the Bermuda Triangle" – as the *Asheville Citizen-Times* dubbed it.

- Suspects in the robbery of a house in Tillamook, Oregon, were apprehended when a private citizen reported to law enforcement a cellular phone conversation concerning the robbery, which he accidentally overheard on his scanner.

- The former chief of the Brevard, North Carolina, Rescue Squad was under electronic house arrest while awaiting sentencing for possession of pipe bombs. The prosecutors asked that his scanner be seized when they realized it contained law-enforcement-only radio channels. They said he might be able to hear private transmissions on the radio that might be about his case, or about court-sanctioned, warrantless searches of his property.

- An investigation has determined that racial slurs broadcast over police frequencies in Westminster and Huntington Beach, California, were either from other police officers with access to radios or from an amateur radio operator. "The police radios are a lot less secure than we've probably led the public to believe," said Westminster Capt. Andrew Hall.

- Berkeley, Albany, Richmond, and California Highway Patrol frequencies have been invaded by someone using profanity to berate and taunt dispatchers. So far, authorities have been stymied in their attempts to stop the illegal transmissions, which began in December '99 with false reports of crimes and increased into obscenity-laced tirades.

Police say the occurrences are rare but that anyone with a fair knowledge of how radios operate could easily penetrate the UHF frequencies used by many police agencies and the VHF spectrum used by the CHP.

- Stolen police radios have caused concern in numerous communities, including Winona, Minnesota, and Swanton, Vermont. Teenagers appear to be involved in both these incidents, both of which have resulted in false emergency calls as well as other mischief.

- In Las Vegas, Nevada, an intruder robbed a local Pep Boys and tied up the employees at gunpoint while communicating with outside help via a two-way radio and an earpiece. The suspect also talked used a cellular phone via an apparatus hooked to his ear, a witness said.

- Two men were intercepted at Ross Lake, Washington, attempting to set up a drug smug-

gling route across the US-Canadian border. They were intercepted by a district ranger and county deputy sheriff. The suspects had in their possession two life jackets with "NPS Park Ranger" stenciled on them, sophisticated radio/scanners, a GPS unit, and quality backcountry gear.

Harry Marnell who contributed this story, said in his post to the Scan-L list, "...once again the media failed to point out that the supposed 'sophisticated radio/scanners' did NOT prevent these guys from being arrested." So why mention 'em?

We know who you're listening to...

Mobiltrak sensors, concealed in a roadside box or posted behind a sign, can recognize the radio frequency you're listening to as your car passes by. "Every radio is also a transmitter," said Lucius Stone, director of sales and marketing for Mobiltrak. "Whatever station you have tuned in, your radio leaks a signal that's just a little bit higher than whatever you have tuned in. It's that electronic emission from the radio the equipment senses and then counts."

"We help clients define where to put their radio advertising so they can reach their customers and potential customers," Stone said.

Privacy advocates have objected to radio listeners being "polled" without their consent, but it's probably too late to close the barn door: Mobiltrak has already installed monitoring equipment at the entrances of shopping malls, grocery stores and restaurants throughout America.

"There are more than 1 million destination retail companies in the United States alone," Stone said. "We're going to be busy a long time."

Not Ready for Year 2000

Spaced every two miles along a 60-mile stretch of the Adirondack Northway are emergency call phones, but they haven't worked since Jan 1st. The ten-year-old system connected callers to the State Police, Troop B HQ. State police are working on a fix.

NSA Crash

National Security Agency computers made it through Y2k just fine – only to crash a month later. The main computers of the National Security Agency failed, causing an unprecedented blackout of information at Fort Meade, where signals intelligence intercepted around the world is processed.

As a result, NSA analytical reports from Fort Meade that turn intercepted foreign telephone, cable and radio messages into meaningful data for the government were halted for four days, a senior intelligence official said. "Other NSA analysis kept flowing from other parts of the world," he added, "but this was not a trivial failure."

The computer shutdown, which was first reported by ABC News, was caused by a "system overload," one source said, and was not the result of a Y2k problem, sabotage or hackers invading the system.

Highway Patrol System Crash

"It was definitely serious," said Larry Austin, the Tallahassee-based Florida Highway Patrol chief who oversees all agency operations in South Florida. In the third week of February, a

glitch in the Motorola communications system affected hundreds of FHP troopers and other state law enforcement agencies from Key West to Orlando.

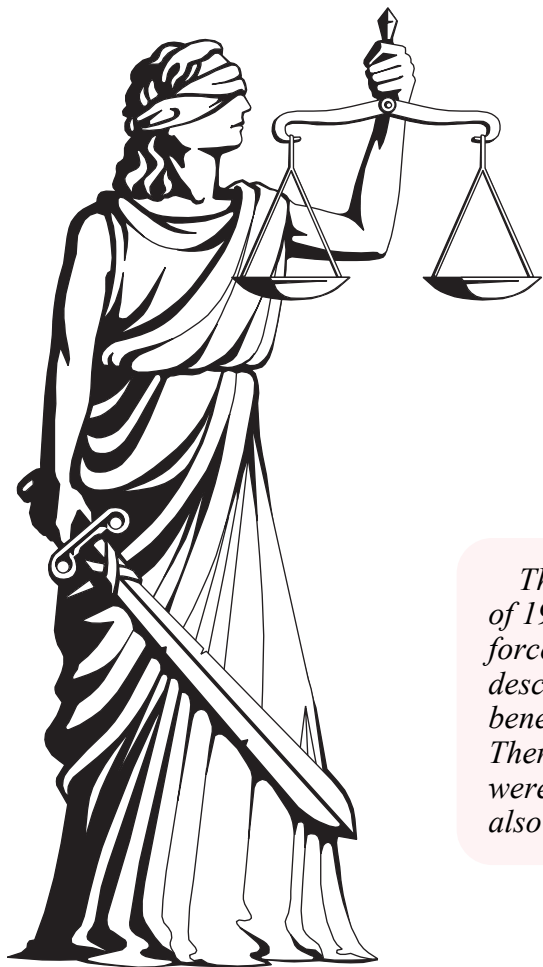
Technicians worked on the problem throughout the day, but were unsure that they had isolated the cause of the problem, and didn't know for certain if it was fixed.

State officials have been trying to build a

statewide radio network for state police agencies since the mid 1980s. What began as a \$167 million project grew in cost to \$354 million statewide. But the network has been installed only in Central and South Florida, covering just under 50 percent of the land mass, but more than 50 percent of the population.

"Communications" is compiled by Rachel

Baughn (mteditor@grove-ent.com) from news clipped and sent or emailed by our readers. Thanks to this month's reporters: Anonymous, NC, NH and NY; Robert Barker, email; Harry Baughn, NC; James Byrne, S Charleston, WV; Warren Eggers Jr, email; Mike Elcsisin, Philadelphia, PA; John Figliozi, email; Thomas Friend, Pittsburgh, PA; J.R. Hertel, Camas, WA; Ken Hydeman, Xenia, OH; Maryanne Kehoe, email; Kevin Klein, Neenah, WI; Sterling Marcher Sr, La Mirada, CA; Alan Masyga, Winona, MN; Larry Mathis, Montebello, CA; Ed Muro, email; S. Prouty, Forks, WA; Doug Robertson, Oxnard, CA; Doug Smith, email; William Szczepaniak, Philadelphia, PA; Robert Thomas, Bridgeport, CT; Jon Van Allen, email; Larry and Gayle Van Horn, NC; R.C. Watts, Louisville, KY; Robert Wyman, email; Radio Romania Intl, email



THE FCC'S PRB-1 AND SECTION 207

ANTENNA LAW

WHAT YOU CAN AND WHAT YOU CAN'T DO

By Ken Reitz KS4ZR

The whole country watched as the grim scene unfolded during the fall of 1999 in North Carolina. The entire state fell victim as the combined forces of Nature dealt a terrifying punishment in what would later be described as a 500 year flood. We watched as entire towns disappeared beneath the murky flood waters. Not even tops of houses could be seen. There was no immunity. In some areas police and emergency services were cut off as power failed and well designed communications systems also became flood victims.

Days before the storm hit, the North Carolina Amateur Radio Emergency Service had already swung into action. Following well rehearsed plans, NCARES implemented emergency preparedness and hundreds of North Carolina amateur radio operators took their places in a back-up role which would soon be put to the test.

During the next week hams all along the East Coast were put to the same test as Hurricane Floyd spent its fury. So valuable was this effort that four months later Virginia's General Assembly passed a joint resolution praising the efforts of Virginia amateur operators who took over communications duties when officials in the City of Franklin were forced to flee their Emergency Operation Center. "...With traditional lines of communications inoperable, the Amateur Radio operators, members of the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES), provided the only reliable communication into and out of the flood-ravaged Franklin area...." the resolution reads in part.

Each year Virginia and North Carolina

hams, as with their counterparts nationwide, come to all types of local emergencies from all manner of homes. They live in suburbs, urban apartments, exclusive gated communities, and farms. They have occupations as diverse as any other group. Wherever they live and whatever they do, they maintain their federally licensed stations, practice emergency preparedness drills and wait for the worst.

But, as long, sunny days erode the memory of disaster, local governments can be lulled by other interests into passing laws and regulations restricting the very people who may have to step in and save the day. Over the decades, throughout America, thousands of towns and counties have set up legal obstacles in the way of amateur operators to prevent them from doing the one thing that has to be done in order to maintain satisfactory communications: set up an antenna. Antennas are the heart of communications. Without them there's no transmission and no reception.

The FCC Weighs In

For years hams have fought a running battle with local authorities for the right to

set up antennas. The largest organization of hams in the U.S., the American Radio Relay League, sought relief in this struggle in 1984 asking the Federal Communications Commission to issue a Declaratory Ruling to preempt the authority of local governments in the matter of amateur radio antennas. The Commission obliged and in September of 1985 issued PRB-1: Federal preemption of state and local regulations pertaining to Amateur radio facilities. In the initial stages of formulating PRB-1 the Commission heard from some sixteen hundred interested parties ranging from individuals to the Department of Defense. Clearly there was a need for a definitive ruling.

The Commission got to the heart of the matter in the "Discussion" section of PRB-1 when it wrote "...Few matters coming before us present such a clear dichotomy of view point as does [this] issue..." It further noted "...we believe it is appropriate to strike a balance between the federal interest in promoting amateur operations and the legitimate interests of local governments in regulating local zoning matters." The Commission, in exercising its authority to preempt, stated, "...We are confident, however,

States Bolster PRB-1

How Does Your State Stack Up?

In recent years amateur operators in several states have had bills enacted in state legislatures to codify PRB-1 in their own state laws. As of this writing six states have laws on the books reminding local governments to keep their regulations in line with Federal law. Florida's law is typical: "...No municipality shall enact or enforce any ordinance or regulation which fails to conform to the limited preemption entitled 'Amateur Radio Preemption, 101 FCC 2d 952 (1985)' as issued by the Federal Communications Commission..."

States with such laws on the books are Florida, Massachusetts, New Hampshire, Wyoming, Virginia and Washington. States with similar laws pending are Maine, Oregon and Texas. In some cases state representatives need only hear from a few voices urging adoption of such pending legislation to get on the bandwagon. Residents in the states with pending legislation can look at copies of the bills at the ARRL's website (www.arrl.org/field/regulations/statutes/html).

While the ARRL's Regulatory Information office does not actively participate in state legal activities it encourages local hams to get involved. By disseminating material through their extensive website (www.arrl.org) the League is an excellent resource for hams in states with no such legislation.

It only takes one ham, regardless of license class, to take this information to the local representative in your area to get the legislative ball rolling. Local representatives are eager to respond to constituents, regardless of party affiliation, especially when it involves such acclaimed activities as ARES, and most especially in an election year. You may be surprised to see how fast your bill hits the state legislature's floor!



that state and local governments will endeavor to legislate in a manner that affords appropriate recognition to the important federal interest at stake here and thereby avoid unnecessary conflicts with federal policy, as well as time-consuming and expensive litigation in this area..." It went on to instruct hams who feel that local governments have overstepped this particular federal interest to make those entities aware of PRB-1.

At first glance PRB-1 might seem like a magic wand: wave it before a recalcitrant town council or zoning board and they'll snap to attention. However, news travels slowly even in the information age. Fifteen years after the advent of PRB-1 there are considerably more licensed hams and considerably more conflicts between them and the localities in which they live. To add to the debate there are far more private communities with strict covenants and restrictions governing antennas and here the Commission has been particularly loathe to intervene.

According to the ARRL, the League asked for clarification of PRB-1 in 1996 hoping to bring private communities with tough restrictive covenants under the authority of PRB-1. Just last November the Commission finally answered the request. The answer was no. Such residences were "...outside the reach of our limited preemption." The League currently has a Petition for Reconsideration before the Commission.

Nor have the states been much help. Despite the Commission's expressions of confidence so clearly voiced in PRB-1, in the intervening 15 years only six states have enacted laws codifying PRB-1 into state law (see sidebar). Despite the seeming muscle of federal law most hams who run into local regulations are on their own. Armed with a copy of PRB-1, the state statute (if there is one) and an attitude of gracious accommodation, chances are most hams will get a sympathetic hearing and be allowed to put up their antennas.

The Legal Trail of Satellite Viewers

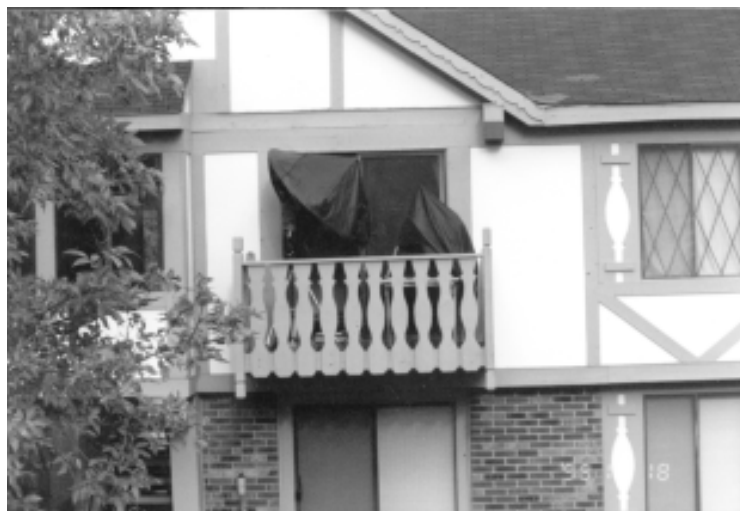
Technology seems to catch everyone off guard. Few of us predicted the CB radio craze, the satellite TV mania, the computer frenzy or the Internet hysteria. It isn't until things are considerably out of hand that the creaky wheels of government try to get rolling.

Initial clashes between satellite TV viewers and local governments came in the 1980s when installations peaked at more than 80,000 units per month and stories of the legal difficulties of satellite TV viewers were well known. However, the introduction of scrambling in 1987 saw a steep decline in issues surrounding satellite TV viewers as many switched back to cable.

1994 brought an entirely new satellite revolution to the forefront. The introduction of DBS satellite TV with its minuscule 18" dish created a consumer electronics phenomenon. Within six years more than 11 million eager customers snapped up the systems and started enjoying a range of cable fare and picture quality unequalled on virtually any wired cable system.

To the joy of consumers Congress enacted the Telecommunications Act of 1996 and, through Section 207 of that act, directed the FCC to lay down rules concerning "...viewers' ability to receive video programming signals from direct broadcast satellite (DBS), multichannel multi-point distribution (wireless cable) providers (MMDS), and television broadcast stations (TVBS)." Such rules carry the weight of federal law.

While consumers were rejoicing, the cable TV and broadcast TV industries were horrified. In the years leading up to 1996 the



This satellite TV viewer's balcony-perched dish is covered by the FCC's latest ruling expanding the Telecommunications Act of 1996 to include rental property.



Wall mounted DBS dishes like this may be only the beginning. The FCC would like to expand the Telecommunications Act of 1996 to include "...advanced and innovative services" and to allow "...nondiscriminatory access to facilities controlled by premises owners."
(Courtesy: KTI)

fight between Big Cable and the Big Networks was the only show in town. Satellite and MMDS customers made up only a fraction of the total viewer count. This was due in no small part to the regulations in many locales against satellite dishes, MMDS antennas and over-the-air antennas of any kind. Now, that would all change.

Consumers in communities governed by tight regulations or restrictive covenants have been delighted to find themselves with a potent new ally: none other than the FCC. Where the Commission feared to tread on behalf of federally licensed amateur radio operators it found no difficulty rushing in. To satisfy the consumer's need for better television the Commission wasted no time declaring, as it has in the Fact Sheet prepared on the subject, that "...Restrictions are prohibited in state or local laws or regulations, including zoning, land-use or building regulations, private covenants, homeowners' association rules or similar restrictions relating to what people can do on land within their exclusive use or control where they have a direct or indirect ownership interest in the property." It couldn't be more clear.

Why the apparent affection for satellite TV? It turns out that what the Commission

really likes is healthy competition in the market place. Throughout the '60s and '70s Community Antenna Television (CATV), as cable TV was originally known, was regulated by the FCC since each CATV system was essentially a monopoly. After it had grown into the giant cable industry we know today, Congress enacted laws deregulating it. A Utopian world of hundreds of channels and lower prices was promised, but what was delivered was apparently the same old monopoly in slightly used wrapping paper.

With the dawn of DBS television the Commission found what it had been looking for in the television industry for decades: competition to the dominant cable TV industry. In order to jump start the competition the Commission has sought to level the playing field. For starters it has preempted restrictions against the installation of satellite dishes up to one meter (39.37"); MMDS antennas; and over-the-air antennas on masts up to 12 feet above the roof line.

But, wait, there's more! In January 1999 the Commission expanded the rule to include those residents of rental property. The Commission's "Fact Sheet on Placement of Antennas" states, "...Renters may install video antennas within their leasehold, which means inside the dwelling or on outdoor areas that are part of the tenant's rented space and which are under the exclusive use or control of the tenant."

The Fact Sheet goes on to explain in part that these areas typically include balconies, balcony railings and terraces, and that renters are not required to obtain the consent of the landlord prior to installing a video antenna in these areas. The Commission also points out that "...the rule does not apply to common areas, such as the roof or exterior walls of an apartment building." The Commission points out that this rule applies solely to video antennas, "...antennas for AM/FM radio, amateur radio or internet are not covered by this rule." This, too, couldn't be more clear.

Legal Recourse for Hobbyists and Consumers

If you're a consumer looking for alternative TV programming to that provided by your local cable company these are good times indeed. You cannot be barred from setting up a satellite system in your home, condo, townhouse or high rise. If the programming you want is not provided by your Association or landlord you have the right to install the equipment which will receive that programming.

If your rights in this regard are challenged, either by a Home Owner's Associa-

tion (HOA) or landlord, the FCC has spelled out specific steps to take for relief from such restrictions. However, FCC preemption will not be invoked if "...[such restriction] is necessary to accomplish a clearly defined safety objective that is either stated in the text, preamble or legislative history of the restriction..." or if "...it is necessary to preserve an historic district listed or eligible for listing in the National Register of Historic Places..." These are the "safety and historic preservation" clauses in the FCC rule which bar preemption of the rule.

If your municipality, HOA or landlord is trying to enforce an invalid restriction you should try to work out the disagreement through mediation. Using material from the FCC explaining Section 207 of the Telecommunications Act of 1996 could be all you'll need to change the restriction. In the event that this fails you may file a Petition for Declaratory Ruling with the Commission.



Photo credit: Ron Buckman

Over-the-air video reception falls under section 207, but not a scanner tower like this one

You don't need a lawyer to do this, but there may be other issues involved which will require legal assistance. Details on the procedure for such a filing are found in the FCC's Fact Sheet "Over-the-Air Reception Devices Rule" (www.fcc.gov/csb/facts/otard.html). This procedure is a lengthy one and you shouldn't expect a ruling in under a year. Meanwhile, under the Rule, you may continue to use the disputed device and not incur additional penalties while the Petition is in progress unless it falls under the safety and historic preservation clause.

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Johnny Autrey's antenna tower covers HF, VHF/UHF, and, yes, TV

If you're an amateur radio operator, things aren't quite so good, but you do get some relief from antenna restrictions if you live outside private areas with restrictive covenants. Even then you are still able to file a Petition for Declaratory Ruling which, at worst, will give you about a year while the Petition is pending.

If you're a shortwave listener or scanner radio enthusiast these are not the best of times. Neither the preemption of PRB-1 nor Section 207 of the Telecommunications Act of 1996 will necessarily help with your hobby. There is nothing in either of these Rules which serve to preempt restrictions against the use of your antennas. However, you might consider expanding your hobby and becoming an amateur radio operator. With the FCC's massive license restructuring and the limited relief from PRB-1, there should be a lot of incentive to study for your Technician Class exam. For information on becoming an amateur radio operator see the ARRL's home page www.arrl.org.

Good Neighbor Policy

Few of us live in such isolated areas that we can completely indulge our antenna fantasies. None of us can afford bad relations with any of our neighbors, and common courtesy tells us that if we want to do such extraordinary things as putting up large antennas, we should do all we can to court the cooperation of our neighbors.

By including your neighbors in your plans and explaining your amateur radio or shortwave listening hobby you may receive more than a passing approval. I've heard many stories of neighbors pitching in to help string wires through their trees in order to help their ham friends have bigger antennas. I've heard of a landlord who helped lay in radials so a renting ham could get his vertical antenna operating better.

I've also heard horror stories of the cranky neighbor who balks at every attempt at cooperation which inevitably leads to mediation or court. If it's clear to you that your installation is headed in that direction don't look to outside organizations to help other than to provide access to information. You may need to consult an attorney and, if you do, you should always keep copies of agreements or other letters and notes of phone conversations with all parties involved for future reference.

You may have to attend board meetings and explain what it is you're doing, and you may be sure that it will be a long and tedious process. Whatever you do, don't go barging into local municipal meetings waving a copy of PRB-1 and bellowing about your rights. Neither should you acquiesce and roll over at the least sign of a struggle. You *do* have rights and carefully navigating the proper legal course will go a long way toward making sure you can enjoy your hobby and still maintain good relations with your neighbors.

One organization long involved with public service and generally unprotected by legal fiat has been REACT International (Radio Emergency Associated Communications Teams). For the last 38 years REACT has been a "...public service organization comprised of private radio operators serving travelers and their communities alike with radio communications." Al Hanger, former REACT International Board member and long-time organization member, says their members have always had to learn to get along in their communities.

Today, while some of their communications are done using Citizen's Band radio, most activities are in the General Mobile Radio Service (GMRS). In his location near Reston, Virginia, a private community notorious for its restrictions, Hanger says most members are GMRS licensed and use repeaters on the 462.675 MHz frequency. The nature of the UHF frequencies, line of sight communications and smaller antennas, makes it easier for them to work in such restricted communities such as Reston. However, he says, they've found the community accommodating to the point of letting resident members mount CB antennas in trees and giving permits to place their GMRS repeaters for maximum coverage.

HOA's Quake as FCC Flexes

When was the last time your Home Owner's Association apologized to you? According to the Satellite Broadcasting and Communications Association (SBCA), a satellite TV industry trade group, it could be happening more often. In one recent case, a private community in Maryland with strict rules against all types of antennas had been handing out violation notices to home owners it said had run afoul of those rules.

The community's lack of compliance with FCC rules was brought to the attention of the Association's Board of Directors which actually issued an apology to homeowners who were affected and, as reported in the SBCA's *SkyREPORT* E-Newsletter, "...Under new guidelines, homeowners may install dishes without permission from the Association. All costs for previous covenant violations also were waived."

Andy Wright, VP for Government and Legal Affairs at the SBCA said, "We get two or three questions every day from homeowners struggling with local regulations against their satellite dishes." Wright says they routinely refer such requests to their web site (www.sbca.org) which has links to FCC rules regarding satellite and over-the-air TV reception in addition to referrals to lawyers who handle such cases.

Says Wright, "It's important to recognize that Congress has passed legislation giving consumers the right to have a satellite dish. Just because the HOA says you must do this or that, you don't." And, he warned, "If forces who want to limit dishes go too far they're going to get Congress involved."

If the actions in the Maryland case are an example, that's apparently a threat HOAs are taking very seriously.





MT's own publisher working on one of his antennas

The Reston Community Association understands that REACT, like its ARES counterparts, are integral parts of indispensable public services which, because they're staffed with volunteers and financed by donations, perform valuable public services and save their community untold city budget dollars. This makes any Association more responsive to requests from all citizens with communications antenna requests.

Into the Future

Boards of County Commissioners around the country are always looking into new ways to seek regulations against antennas. A back door approach is to claim radio frequency interference (RFI). One county in Kansas sought to have a 150 foot Southwestern Bell cell phone tower removed claiming it was interfering with public safety communications. Southwestern Bell received a declaratory judgement from the FCC that the county's regulation was preempted. The county appealed and the U.S. Court of Appeals for the 10th Circuit upheld the FCC preemption of RFI issues.

Following the expansion of Section 207 to include renters, William Kennard, FCC Chairman wrote in a separate statement, "...I am disappointed that Section 207 did not permit us to go as far as we might have to promote competition and eliminate barriers for all consumers...prohibiting restrictions can only take us part of the way. Section 207 does not authorize the Commission to im-

pose an affirmative duty on landlords to provide access for competitive video providers, and the statute does not clearly address the Constitutional requirement for 'just compensation' that may be necessary to give consumers access to the roof or common areas of the landlord's property. Nonetheless, I am committed to working toward a complete solution to this problem..."

More changes from the FCC can be expected in the future for satellite dish owners. But, amateur radio operators may expect no such assistance. Instead, working to get state laws on the books in support of PRB-1 and continued activity in emergency preparedness is the best way to assure a supportive atmosphere in state legislatures and a kindlier disposition in local government hearings.

In the aftermath of a local disaster hams and others participating in emergency support communications should not be shy in promoting their successes to state and local governments, it may be the only positive publicity they'll receive and it could go a long way toward future accommodations when new legal restrictions are contemplated.



RESOURCES: WHERE TO GO FOR MORE INFORMATION

Amateur Radio Relay League
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FAX: 860-594-0259
Web Site: www.arrl.org

Federal Communications Commission
445 12th Street S.W.
Washington, D.C. 20554
Phone: 888-CALLFCC (888-225-5322)
Web Site: www.fcc.gov

Satellite Broadcasting and Communications Association
225 Reinekers Lane Suite 600
Alexandria, VA 22314
Phone: 703-549-6990
FAX: 603-549-7640
Web Site: www.sbca.org

REACT, International
5210 Auth Road #403
Suitland, MD 20746
Phone: 301-316-2900
FAX: 301-316-2903
Web Site: www.reactintl.org

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Devices

What the FCC Will and Won't Allow

Section 207 of the Telecommunications Act of 1996 prohibits state and local laws that restrict the installation, maintenance or use of antennas to receive video programming. These include:

- "Direct-to-home" satellite dishes that are under one meter (39.97") in diameter or dishes of any size in Alaska.
- TV antennas and MMDS (wireless cable) antennas on masts less than 12' above the roof line.

Do not include:

- TV antennas designed to receive distant TV signals.
- Antennas for AM/FM radio, amateur or internet.

In addition, governments, community associations and landlords may not charge a fee for a permit or require a viewer to incur additional costs associated with installation. And there must not be any undue delay in granting such permission. The Rule covers consumers living in detached houses, town houses, and condominiums owned by consumers. It also covers apartment houses, town house complexes or other rental property. It also covers mobile home parks.

And, finally, during the time that a Petition for Declaratory Ruling is in process, the disputed device may not be removed and no additional penalties may incur. In the event that the Commission rules against your petition you will have a minimum of 21 days to comply with the judgment.



There are Antennas and there are *Antennas!*

By Arthur R. Lee WF6P

A few years ago I was intrigued by an antenna put up by one of my friends, Patty Winter, N6BIS. She lives in a mobile home park where visible antennas are forbidden. With the help of a few ham friends, she insulated the attach points and other supports of her aluminum awning and converted it to a fine RF radiator, dubbing it her “Awntenna.”

I don’t know what her standing wave ratio (SWR) was, but with a good tuner, most of us can get some sort of signal out of the most outlandish antenna combinations. When I last talked to Patty, she had many hours of enjoyment of on-the-air conversations (QSOs) with her hidden antenna.

DX? I don’t know, but I suppose so. Why not? Distance reception mostly depends upon propagation anyway. She’s good in the *Amateur Radio Call Book* so you would have to ask her.

More Stealthy Antennas

Another hidden antenna that was interesting to me was simply a very thin wire, strung from the sixth floor of an apartment building and guyed to a fence at ground level. My friend lived 500 miles away in San Diego and yet he had one of the strongest signals on the 40 meters band. For several years he acted as net control for the Baja Maritime Mobile Net (7.238, daily at 0800 PST/PDT) until he moved. You could not see the wire, so none of the building’s occupants complained. (Besides, he was on the Board of Directors!)

Another friend solved the “hidden antenna” problem by erecting a flagpole in his backyard. He ran his coax up the hollow pole and the “guys” for the flag pole were the two legs to his 40 meter dipole. To avoid detection, he didn’t use insulators on the ends of his wire, which was nearly invisible due to its small diameter. Instead, he glued strong nylon thread directly to the wire and tied each end off at the fence.

His invisible antenna had a very strong signal. A couple of problems he experienced were unusual. Occasionally, birds would fly into his wire and snap the nylon

thread. Also, he thought, after many hours of use, the UV rays of the sun would crystallize the nylon, and it would snap off.

Not All Antennas Have To Be Perfect.

One winter, just before Christmas, I was sitting in my living room, reading. Outside there was a mild wind storm. With gusts of up to only 30 knots, I didn’t give my beam antenna too much thought. My wife and I were suddenly startled by a heavy clatter on our rooftop. The old poem, “Twas the night before Christmas, when all through the house, not a creature was stirring ...” came to mind. Was it Saint Nick’s reindeer’s hooves and his sleigh we heard?



Photo 1. When my antenna tower was lowered for maintenance, my 40-meter dipole came down with it.

Nope, it was the crashing down of the 25 foot trapped reflector of my tri-band antenna.

I should have known. The element had been slightly drooping for a few months. Too many birds perched on the same side, I assumed; that, and a loose clamp. When our son Randy, N6UZI, arrived with his family for Christmas, he helped me lower my tower. With my tower down, my 40 and 80 meter dipoles were also down. I was out of HF communications.

However, I did have a regular schedule with Marsha, AB7RJ, a fine Morse code operator in Washington state. I looked over the jumble of antenna wire and just about



Photo 2. The center connector and coax were only 3 feet off the ground.

gave up. I could always send her an Email, explaining my predicament.

Then, it occurred to me that the unused trapped “Vee” antenna that was given me by Terry Parks, N6NUN, was still usable. Long neglected, it was bolted upright to our wooden sun deck. All I had to do was to connect a 20 foot length of spare coax and I would be back in business. Ten minutes before our 0830 schedule, dressed in my slippers and pajamas, I hurried out on the rear deck. I pushed aside a loop of my 40 meter wire. It had been was shorting out one leg of my “Vee” antenna. I quickly connected the coax, led it back in through the open patio door and plugged it into my antenna switch.

A quick touch-up with my antenna tuner revealed that my SWR was not too bad, 3:1. I put out a call on schedule and Marsha gave me a signal report of a “459,” so we went on with our QSO. My signal was weak but readable, so we stayed on for about 40 minutes. There was some fading of the band so we finally signed off.

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Photo 3. Both legs of the dipole were lying loosely along the deck, sidewalk and draped from the roof and chimney of the house.

When I switched my rig to the broadcast band to listen to the morning news, I happened to glance at my antenna switch. I was surprised to see the antenna switch in the wrong position. In my rush to get on the air, I had not selected the “Vee” antenna! The switch was still set on my old, downed and fouled 40 meter dipole position. This couldn’t be!



Photo 4. The dipole antenna was draped across a hedge, nylon guy lines and a flowerpot.

Back out on the deck I examined the wire. Oddly, it was only a few feet above ground level. Moreover, it was not touching any metal from either the tower or the roof drain pipes. One leg of the dipole was partly suspended by a small hedge, then lay flat on my wooden deck. The other leg hung limply in a long loop over the roof of the house and down toward the patio. Nowhere along its

Within his family, Arthur Lee is known as the “King of Communications” – in part, perhaps, because he seems to have fathered quite an amateur radio dynasty. This story is by his daughter, KN6RR, about her daughter, KE6BOP.

The Queen of Communications

By Joyce C. Rusch KN6RR

My daughter Cheri, KE6BOP, has always had a flair for chatter. Over the years when she was a teenager I had to limit her phone use in order to keep our phone line free.

When it came time for her to learn to drive a car, I insisted that she get her ham radio license before her vehicle driver’s license. Most of my family are ham radio operators and we found it a fun and easy way to keep tabs on each other.

My daughter was quite active in high school. She was a cheer leader, played in the jazz band, and went to all social events. With all this going on, she could usually be found on campus. I didn’t want her to drive alone at night without her being within earshot of help.

My daughter’s musical background made the learning of Morse code come easily to her. A good friend of my father’s, Mary Duffield, WA6FKA, taught ham radio at the local high schools. Mary gave us a unique code tape keeping time with rap music. Not only was the rap tape fun to listen to but it was instrumental in helping my daughter pass the code test for her General Class license.

Little did I know what doors ham radio would open. It wasn’t long before she talked her math teacher, Dan White, himself a ham, into starting up a ham radio club. She also talked her grandfather into ordering an ARRL patch which I sewed onto her letter jacket. Soon, she was writing a “Young Hams” column in the local ham radio club newsletter.

It seemed that she wasn’t as interested in driving as much as she was in talking to all the fine folks on the nets. Many a night she would be talking to her grandfather as we pulled into an out-of-town high school parking lot. After football games I hardly had time to start the car before she keyed up, asking for a radio check or calling a ham friend on the net.

Our family was relocated to a new town where my husband had received a job offer. Almost immediately, my daughter expanded into her new surroundings. By

the time she graduated from high school, she had acquired her own phone line, three ham radios—two of which were hand helds, and a pager. My complaints to my father were always met by a knowing smile as he, himself, was referred to as the “King of Communications” by our family.

After her completion of high school, my parents invited my daughter to stay with them while attending a local community college. I kept in touch with her by including her in my daily 80 meter QSOs with my parents. With her busy schedule of work and school, it was a rare time that she was home. As the months went by, I began to have trouble getting through to my father on the telephone. We used the old, tried-and-true “one-ringer” method to signal that a QSO was desired. My father’s line was always busy. Without a regular schedule, our method did not work. As a result, our 80 meter QSOs became more and more infrequent.

When my parents visited us last, I voiced my concerns regarding our lack of QSOs. Then I noticed my father’s usual smile waning. My father is always busy with his many community functions, various clubs, ham radio activities, writing and weekly luncheons. He wasn’t receiving as many calls as he should, either. His friends were constantly complaining that they couldn’t get through because his phone was always busy.

One day, my father found the source of his problems. Comfortably sitting at his desk in his study was his beloved granddaughter. She was typing on the computer, the telephone cradled under her chin. She laughed at some unknown comment, paused, then passed the message over the 2 meter rig. Expertly, she continued to type as she alternated from the telephone to the microphone. My father who had introduced us all to the wonderful world of ham radio, had met his match. Amazed, he witnessed an exciting glimpse of his next generation. There before him sat his Queen of Communications.



Photo 5. A formerly unused "Vee" antenna was mounted on the deck as a temporary substitute for the tower and tribander.

length did it short out on metal or the wet sidewalk.

The following morning I gave Marsha a call on the "downed" dipole. She gave me another good signal report. Then I told her to stand by as I switched antennas. "Wow! Art, what did you do?" she asked. In switching from the dipole to the "Vee," my SWR went to a 1.2:1 and my signal strength doubled. Marsha uses earphones, so on her

next transmission she said, "I had to cut my gain way down!"

I guess the rule that a dipole should be at a height of at least a half wave length is a good rule of thumb, but, even with less efficiency, the practically grounded antenna did get my signal out. It was not too bad, either, and the antenna was not stretched out to its full measured length. The sagging loops shortened it considerably.

I have always wanted to know if the barbed-wire fence at the end of my property



Photo 6. The dipole was shorted out against the "Vee" antenna mount.



Photo 7. By inadvertently selecting the wrong antenna, transmissions were sent out from the dipole at a three-foot high elevation.

could be used as an emergency HF antenna. I guess the only way that I can answer that question is to give it a try!

Art

About the author

Arthur Lee is a retired Navy Commander who has also taught aviation maintenance management. He is a prolific writer in amateur radio and maritime publications.

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Extending the Range of the Quadraform Loop

By Richard Q. Marris G2BZQ

The writer's article, "A Quadraform LF Receiving Loop Antenna," which appeared in the November 1999 issue, used a somewhat unusual design which covered the frequency range 120 kHz to 220 kHz. The article brought some interesting feedback from readers.

One question was, "could the frequency range be modified to cover the multitude of beacons and European longwave AM broadcast stations?" An upper frequency of around 450 kHz was suggested. The longwave AM broadcast stations are definitely DX in most parts of the world outside of Europe, but hobbyists enjoy the challenge, nonetheless.

Readers also asked about the possibility of covering the mediumwave BC band, the shortwave HF bands, and even the FM VHF broadcast bands between 88 and 108 MHz!

Some answers

The original loop design has been modified to cover two ranges: 120-220 kHz and 148-445 kHz. The simple modifications do not involve any mechanical changes.

The original quadraform loop cannot be extended to cover the MW broadcast band. However, a design has been worked out on paper for a Mark 2 model to cover from around 500 kHz to 2 MHz. It will use identical mechanical construction, and we hope to submit such a design later.

The loop is not usable on the shortwave HF bands, as a complete redesign would be necessary. (See this month's *SW equipment review for an alternative* - ed.) However, the loop was plugged into a general coverage SW receiver, and with the tuning capacitor at maximum capacity

it produced quite acceptable reception as an indoor antenna, though it could not be resonated to frequency and has no directional properties. Presumably it works as a "lump" antenna.

Just for fun, the original quadraform loop was plugged into a VHF FM receiver covering 88-108 MHz. It received stations up to maybe 50 miles away, but don't get excited - so will a test lead of about 3 feet long!

Extending the frequency range

The simple modifications to follow involve no changes to the mechanical construction or the wire turns.

Figure 1 shows the original circuit, which appeared in the November 1999 issue. Figure 2 shows the simple modification, which consists of "switching in/out" of capacitors C2 and C3. When connected, the frequency range is 120 kHz to 220 kHz. When C2/C3 are disconnected, the range becomes 148 kHz to 445 kHz.

The construction required is minimal. Just mount C2/C3 on a small piece of insulated board and fit two short connecting leads, fitted with miniature alligator clips. An alternative idea would be to use plugs and sockets or even a good quality ceramic switch.

RF

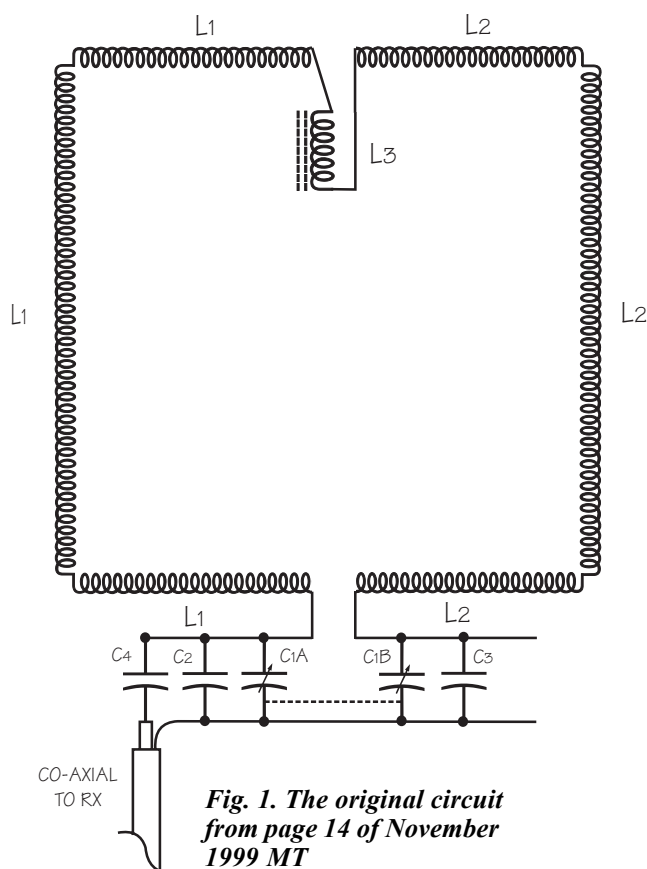


Fig. 1. The original circuit from page 14 of November 1999 MT

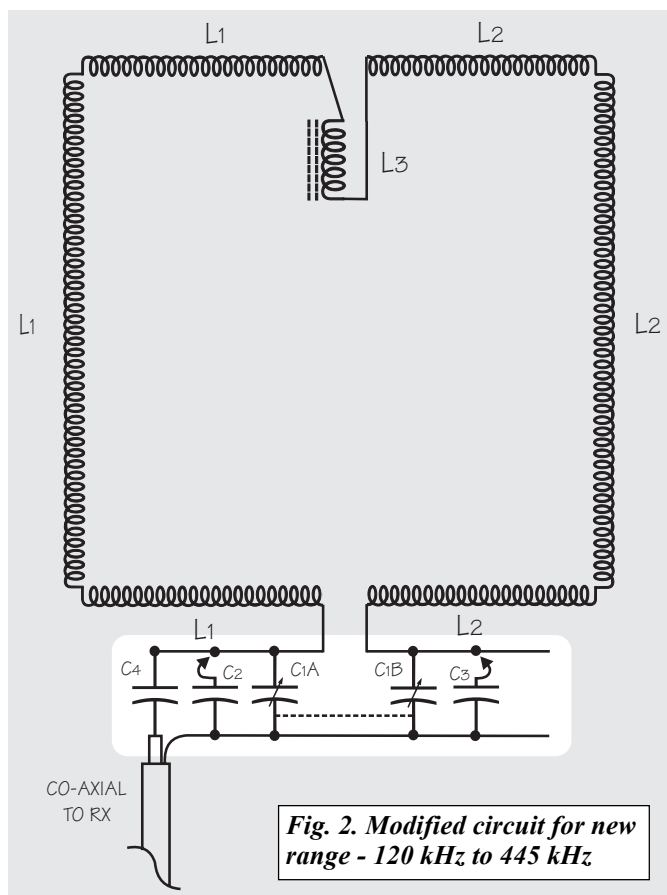


Fig. 2. Modified circuit for new range - 120 kHz to 445 kHz

20th CENTURY NOSTALGIA

THE RADIO WAR OVER VIETNAM

By Hans Johnson
Photos by Harold Mull

"American GI – you want an end to the war. Get out of the fighting now and alive. Come home while you can."

From I Corps in the north to the steamy delta in the south on this April evening in 1970, these words crackle over transistor radios in South Vietnam. GIs recognize the voice as Hanoi Hannah and the station as Radio Hanoi, known officially as the Voice of Vietnam.

Twenty-five years ago, with the fall of Saigon April 30, 1975, the Second Indochina War was finally over.

Fought with the same intensity as the war of bullets and bombs, North Vietnam and the United States wrestled over the airwaves through a variety of propaganda stations, some very open, others very mysterious to this day. None were more famous (or more notorious, some would say) than Radio Hanoi.

"This is the Voice of Vietnam broadcasting from Hanoi to American servicemen involved in the Vietnam War."

From that simple opening, North Vietnamese propaganda flowed over the short waves for the next half hour. Drawing selectively from a variety of sources, including Western ones, the programs highlighted defeats of American and "Saigonese" forces and described resistance to the war in great detail. Programs concluded with a list of Americans recently killed in action, a segment that opened with the phrase, "Those who died, but not for Old Glory."

Jack Bock started tuning in to Radio Hanoi during the Gulf of Tonkin incident in the summer of 1964. Working as a technical representative for Philco in Thailand in that year, there wasn't a whole lot to do. "You could drink or listen to the radio. I did a little of both," he recalls. Bock paid close attention during this time, tuning in not only to Radio Hanoi, but to the American Forces' Far East Network and China's Radio Peking as well. "Looking back on it, it seems that Radio Hanoi was more correct in describing events from that time," he adds.

"American GI - should you be the last man killed in this unjust and losing war?" was a typical Radio Hanoi snippet aimed at undermining American morale. As more American troops poured into Vietnam in the late 1960s, Hanoi responded by airing several repeats of its daily program for American GIs. Radio Hanoi also ditched the traditional Vietnamese music it was playing and started spinning Aretha Franklin, The Rolling Stones, and Phil Ochs. All were courtesy of record donations from Americans opposed to the war.

"Our crypto guy used to listen to them," says John "Doc" Upton, a Corpsman who served with 1st Recon, 1st Marines, in 1969 and 70. "He called us over one day and I actually heard Hanoi Hannah describe one of our unit's patrols conducted the day before in the northern A Shau Valley, down to the fact that the patrol escaped by hanging onto the bottom of a helicopter," Upton

recalls. "If the guys in 1st Recon were shaken by anything, it was the fact that the next morning she could tell what happened to us the night before," he adds.

American Voices Against the War

What really distinguished Radio Hanoi were not the jabs by the Vietnamese announcers, but rather the words of various Americans. One who spoke freely, perhaps even eagerly in August 1972, was Jane Fonda – "One thing that I have learned



Fonda singing anti-war songs while North Vietnamese reporters hold microphones. Published by Nihon Denpa News, July 1972.



beyond a shadow of a doubt since I've been in this country is that Nixon will never be able to break the spirit of these people; he'll never be able to turn Vietnam, north and south, into a neo-colony of the United States by bombing, by invading, by attacking in any way."

Fonda's voice was perhaps the most famous American voice emanating from Radio Hanoi. But there were others, such as Black Panther Eldridge Cleaver, not to mention scores of lesser known Americans. As early as 1966, Ronald Ramsey, who claimed to represent workers and students opposed to the war, made broadcast tapes and mailed them via Canada to Hanoi, which promptly aired them. An anti-war group known as WPAX sent to Radio Hanoi Beatles' music interspersed with anti-Nixon commentaries. Yet others sounded like Britons trying to fake an American Southern accent.



Son Tay POW Compound, photographed by a reconnaissance drone in 1968. DoD photo

Hanoi did not stop there, for it had no qualms in torturing American prisoners of war (POWs) to extract "testimonies," such as this one transmitted on July 12, 1971 – "During the three months of February, March, and April [1968], I witnessed and participated in crimes against the South Vietnamese people. I was captured on April 25, 1968, by the National Front for Liberation. My testimony involved murdering of innocent civilians, burning of homes, looting of property, butchering civilians and prisoners, and air strikes and artillery shelling."

Hanoi aired many other similarly forced confessions. Other POWs had to record Christmas messages or audio letters. Radio Hanoi also forced American POWs to listen to the station by piping it into their cells. North Vietnam's massive and systematic use of American POWs in broadcasts was unprecedented. John Nichols, co-author of *Clandestine Radio Broadcasting*, comments, "The use of POWs in broadcasts was certainly reprehensible and it might be deemed as a war crime."

Was There an American Audience?

Radio Hanoi transmitted this stew of Vietnamese and American voices several times a day, but just who was listening? The

American government's Foreign Broadcast Information Service [FBIS], a branch of the CIA responsible with monitoring foreign broadcasts, certainly was. Sadly, FBIS had to pay close attention to the POW broadcasts for they might be the first indication that someone had indeed been captured. A few newsmen also tuned in. But only a few GIs listened.

"There was no compelling reason to listen," explains Lawrence Lichty of Northwestern University, adding that Radio Hanoi's programs were not that interesting nor were the shortwave transmissions that easy to receive.

"This was the beginning of the cassette revolution and GIs were listening to music cassettes for entertainment, not Radio Hanoi," Lichty adds. This was also a war where 20% of the GIs had their own television sets. "There was some listenership, a lot of it was just curiosity and a bit of it was defiance, particularly towards the end of the war," explains John Nichols.



Liberation Radio

Its propaganda and repulsive tactics aside, it was always clear to anyone listening to the Voice of Vietnam as to who was behind the station and where it was broadcasting from. Other stations were not so open. On the communist side, the Viet Cong's Liberation Radio was the best known. Larry Magne, publisher of *Passport to Worldband Radio*, describes Liberation Radio as a "white" clandestine station. "If a station represents whom it says it does, then it is considered white," he explains.

In the early years of the war, Liberation Radio transmitted mostly in Vietnamese. With slow, dictation speed news, communist party cadre in South Vietnam copied down Liberation Radio's views and then disseminated them further.

With programs and a format very similar to Radio Hanoi, Liberation Radio in 1969 started English transmissions for Americans serving in Vietnam. Liberation Radio often used Radio Hanoi material without attribution and, like Hanoi, exploited American POWs in its broadcasts.



These soldiers preferred to make their own music than to listen to Radio Hanoi.

The real mystery is where Liberation Radio transmitted from all those years. Those who saw the National Liberation Front/Provisional Revolutionary Government as independent of Hanoi seemed more inclined to make the case that Liberation Radio transmitted from Cambodia or even South Vietnam itself.

Lawrence Soley, co-author of *Clandestine Radio Broadcasting* recalls, "I'm pretty sure that it was coming from South Vietnam. Liberation Radio had a line that deviated from that of North Vietnam."

He adds, "After the end of war, one of the chief operators was arrested by the communists, who clearly did not want an independent line."

Others maintain that it was coming from Hanoi all along. "I pushed this very issue with FBIS and they said, 'Look, we know it's coming from Hanoi,'" recalls Lawrence Lichty, implying that radio direction finding pegged Liberation Radio's location to Hanoi.

Wherever Liberation Radio may have started transmitting from, it is clear that it was coming from Hanoi by late 1972. Among other targets, the B-52s of Linebacker II struck the Voice of Vietnam complex on December 19, 1972, not only taking much of Radio Hanoi off of the air, but Liberation Radio as well, indicating that Liberation Radio's transmitters were located at the same complex.

While most GIs were at least familiar with Radio Hanoi, many have never even heard of Liberation Radio. So more than likely the broadcasts for GIs had a small audience – almost certainly smaller than the audience tuned in to Hanoi.

"Counter-clandestines"

The CIA also transmitted Liberation Radio – or so it seemed. From studios in the heart of Saigon, the Agency retransmitted the Vietnamese programs of Liberation Radio programs with the exception of the news. Instead, the CIA substituted its own "news," playing up communist defeats and stressing the inevitability of Allied victory.

Transmitting on frequencies very close to those used by the real Liberation Radio, the CIA-backed station "surfing," catching unsuspecting listeners who thought they were tuned to the real Liberation Radio. This was a classic "black" clandestine – a station pretending to be an existing friendly service when it was indeed run by the other side. The Agency also spoofed Radio Hanoi's Vietnamese language service at times during the war.

In February 1969, two Navy NC-121s (Super Constellation), equipped with television and radio transmitters, started broadcasting South Vietnamese and Armed Forces-Vietnam television programs. Known as *Project Jenny*, the television broadcasts were a smashing success and the PX quickly sold out of television sets. What was not known at the time was that the part of the project secretly aimed at North Vietnam had started months earlier.

Taking off out of Danang six nights a week, the third NC-121 of squadron VXN-8 would fly north and establish a race track pattern between Haiphong Harbor and Hainan Island. From this orbit, the aircraft transmitted on both AM and shortwave to North Vietnam. "Air America couriers brought us the reel-to-reel tapes of the Vietnamese language programs we were broadcasting," recalls Steve Robins, a Chief Radioman on the flights. On the one night of the week, which the Navy aircraft took off, an Air Force EC-121 of Project College Eye would fly the mission.

The CIA played upon North Vietnamese fears of China through a "gray" clandestine called *Voice of the Patriotic Militiamen's Front*. Gray stations didn't reveal who was backing them but pretended to be an independent organization airing its own programs rather than masquerading as an existing station.

"The Front station also criticized Washington and Saigon, thus establishing its credentials as a 'friendly' station," recalls Don Jensen, a journalist who closely followed the operation. In a typical program, the Front "call[ed] on all big nations to exert influence to stop aggression by North Vietnamese forces.... to remove U.S. troops from South Vietnam.... to compel U.S. interventionists to stop barbaric bombings... de-



nounces plot of China to foster war all over the world so as to dominate South East Asian countries." Transmissions usually ended with coded messages for non-existent guerrillas operating deep inside North Vietnam.

The withdrawal of American forces and the signing of the Paris Peace accords in 1973 did not bring an end to the CIA role in propaganda broadcasts. The black Liberation Radio continued and the Agency added a gray station known as *Mother of Vietnam*. Mother of Vietnam claimed to be privately-owned and featured a soft spoken female announcer known as Mai Lan or Morning Orchid. Reading scripts prepared by the CIA and North Vietnamese defectors, Mai Lan encouraged communist soldiers to stop killing and return home for the sake of themselves and their families.

The various American efforts did have a bit of audience, but the Viet Cong and North Vietnamese usually tuned in elsewhere when they were looking for information. And it wasn't to Liberation Radio or Radio Hanoi, either. "Studies show that the VC and North Vietnamese listened to the British Broadcasting Corporation, which they saw as not having a stake in the conflict, when they wanted reliable news," explains Thomas Hoffer, one of the authors of *Broadcasting in Asia and the Pacific*.

Radio propaganda in Vietnam spread plenty of misinformation and disinformation. It created some homesickness and probably even caused a few defections. "The stations weren't necessarily designed for large-scale demoralization. Given the relatively low costs of operating the stations, if you could demoralize just a few, it's been successful," explains Lawrence Soley. So unlike the immediate fatal result of a bomb or a bullet, radio propaganda was more akin to seeds, finding fertile minds here and there and slowly doing its work.

About the Author: Hans Johnson is a shortwave DXer and freelance writer, and founder of the Cumbre DX newsgroup, www.cumbredx.org

About the Photographer: Harold Mull was a member of 1st Pathfinder Detachment, Hdqtrrs Comp, 1st Aviation Battalion, 1st Infantry Div, Fooloy, Vietnam, during 1968-69. He would like to hear from former members of his company; contact *Monitoring Times* and we'll be happy to put you in touch with him!

HEAR HANOI YOURSELF

Jack Bock spent a lot of time listening to Radio Hanoi on a small Sony three-band radio. He also recorded much of what he heard on a tape deck that was almost as small. After storing his tapes in a barn for two decades, Bock donated his collection to the Vietnam Veterans Radio Network. The Network had a treasure on its hands and asked for help in polishing it up. The National Archives kindly cleaned up the tapes and remastered them. A catalog of the tapes is available for an SASE to: VVRN, 7807 N. Avalon, Kansas City, MO 64152.

JUST WHO WAS HANOI HANNAH?

Like Tokyo Rose of World War II before her and Baghdad Betty of the Gulf War after, Hanoi Hannah did her best to discourage and persuade Vietnam-era GIs. Hanoi Hannah wasn't a single woman, but actually a collective name for several of Radio Hanoi's women English announcers. Each name conjures up an image – Sister Love, Perfumed Orchid, Autumn Fragrance.

It is Autumn Fragrance, or Thu Hong, who Americans usually believe was the one and only Hanoi Hannah. Taught English in private lessons at a young age, her real name was Trinh Thi Ngo. Ngo's pronunciation of English was fine enough, and while her voice may have had some appeal to isolated GIs, it certainly wasn't lovely. Nor was Ngo particularly versed in American slang and her attempts to sound hip often just ended up sounding clumsy.



Voice of America Cuts European Services

by Glenn Hauser

Lay-offs at the Voice of America anticipated in our January *Global Forum* lead, (which was copied and recopied to the point of illegibility as it was passed around the VOA), have come to pass.

At a "Town Meeting" February 10, VOA Director Sandy Ungar announced that 51 positions would be eliminated through a reduction in force (RIF). The entire process, including programming changes, will be completed by the end of August. No languages are being completely eliminated at this time. Two Baltic languages, but not the third, Estonian, are subject to cuts because Estonian enjoys more popularity and higher ratings than Radio Free Europe/Radio Liberty in the same language.

The breakdown of positions eliminated per service is as follows: European Division: Czech 6, Hungarian 11, Polish 16, Latvian 3, Lithuanian 4, Slovene 1, Romanian 1. The remaining 15 positions from these six languages will comprise a multimedia news unit within the European Division. The unit will provide targeted feeds to affiliates, weekend feature feeds, audio and text for a special web-based news service, and occasional TV spots.

East Asia and Pacific Division cuts: Lao 3, Latin America Division: Brazilian 1, News Division: 4, three in New York, 1 in Chicago.

These amount to 46 currently filled positions. In addition, five other positions will be eliminated from the New York and Chicago bureaus, to adjust to budget limitations. VOA has been staffed beyond its budget since the start of FY 1999.

Changes in Air Time

Amid these cuts, one VOA language service is expanding. VOA Uzbek, which was 1500-1530 daily and 1530-1545 Saturday and Sunday only, changes to 15 to 1545 daily as of Monday. The frequencies are 9745 via Kavala and 11740 and 11850 via Morocco. Democracy and press freedom have not flourished in Uzbekistan. U.S. State Department spokesman James Rubin described the January ninth presidential elections in Uzbekistan as "neither free nor fair." U.S. funded Radio Free Europe/Radio Liberty, based in Prague, continues broadcasting four hours per day in Uzbek. All U.S. broadcasts in the language are transmitted on shortwave as rebroadcasting opportunities do not presently exist in Uzbekistan.

The following VOA language cuts are to be effective with the European Time Change Sunday, March 26, 2000, daily unless otherwise stated:

CANCEL Polish 0500-0545 UTC
CANCEL Polish 2200-2300 UTC
CANCEL Hungarian 1400-1415 UTC
CANCEL Hungarian 1500-1515 UTC
CANCEL Hungarian 1600-1615 UTC
CANCEL Hungarian 2000-2030 UTC
CANCEL Czech 2000-2030 UTC
CANCEL Czech 0430-0500 UTC
CANCEL Latvian 1530-1545 UTC M-F
CANCEL Latvian 0445-0500 UTC M-F
CANCEL Lithuanian 0400-0415 UTC M-F
CANCEL Slovene 1730-1745 UTC M-F
CANCEL Albanian 1400-1415 UTC
CANCEL Croatian 1830-1900 UTC
CANCEL Serbian 0430-0500 UTC

The following program changes are to be effective with the Eastern Time Change Sunday, April 2, 2000:

CANCEL Khmer 1430-1500 UTC Daily
CANCEL Lao 1300-1330 UTC Daily
CANCEL Burmese 1200-1230 UTC Daily
CANCEL Vietnamese 1230-1300 UTC Daily
INSERT Burmese 1430-1500 UTC Daily
INSERT Bangkok MW for Vietnamese 1300-1330 UTC Daily [cancelled from Lao 1300-1330 UTC above]
INSERT Bangkok MW for Burmese 1430-1500 UTC Daily [cancelled from Khmer 1430-1500 UTC above] (Kim Elliott, VOA Communications World Feb 19 via John Norfolk, OKCOK, DX Listening Digest)

Proposed enhancements authorized by the Broadcasting Board of Governors, if sufficient funds become available:

AFRICA: reinstate 13:30 recently cut in Amharic, English to Africa, Hausa, French to Africa, Kinyarwanda/Kirundi, and Swahili
INDONESIAN: acquire 24h FM frequencies in Jakarta and Dili, increase marketing and promotion
MACEDONIAN: expand from 15 to 30 minutes
SPANISH: establish targeted news and info service for Colombia, where press freedoms are being threatened by a bitter, internal war (Colombia is the third largest recipient of US foreign aid.)

The Rationale Behind the Cuts

A VOA press release says: "The measures are a first step in what the Board

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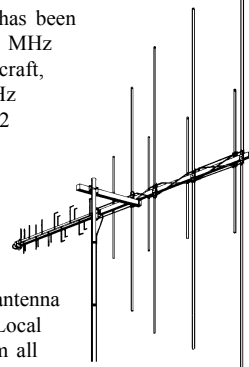
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envisions as a progressive realignment of strategic priorities and reallocation of US international broadcasting's resources over several years. They come at a time of increasingly scarce resources for overseas broadcasting in the wake of the end of the Cold War. The measures also underscore the need to use these funds efficiently to provide accurate, objective news and information and to support emerging democracies, as well as to make creative and cost-effective use of the Internet and other new media to deliver programming.

"The BBG's language review recognized the growth of democracy and free media in many countries which US international broadcasts have successfully reached for many years. Accordingly, the Board has decided to implement service reductions for the Voice of America's broadcasts to Hungary, Poland and the Czech Republic. All three countries are now members of NATO, and each has fully free and open media.

"No broadcast service will be eliminated, and, in order to meet potential crisis needs, the surge broadcast capability of all services will be maintained.

"In undertaking its language service review, the Broadcasting Board of Governors examined where the US should broadcast and how well the broadcasters are doing the job. The Board evaluated the services using such criteria as media environment, political and economic freedom, audience size, programming quality, transmission effectiveness, cost, broadcast hours and awareness of the broadcast in the target area.

"The Board is appointed by the president and confirmed by the US Senate, and the Secretary of State is an ex officio voting member of the BBG. The current members, not including one vacancy, are: Marc B. Nathanson, Chairman; Madeleine K. Albright, Secretary of State; Tom C. Korologos; Edward E. Kaufman; Carl Spielvogel; Bette Bao Lord; Alberto Mora; and Cheryl Halpern."

A BBG fact sheet reports: "What criteria did the BBG consider in conducting its Language Service Review? It examined US broadcasting priorities as well as the effectiveness of VOA's and the other entities'

broadcasts, as measured by the audience ratings compiled by the IBB Office of Research. The BBG considered these factors: the ongoing strategic significance to the US of geographic regions and their languages; the relative media self-sufficiency or dependence on external broadcasting; the state of press freedom around the world; the importance of the free flow of neutral, unbiased info to the promotion of democracy; the relative impact and effectiveness of existing broadcasts; and awareness of VOA broadcasts in target areas as measured by audience research.



VOA Director Sanford (Sandy) Ungar

"Forexample, VOA's Lao Service will be drawn down; research has revealed that VOA Lao broadcasts capture only a minuscule percentage of listeners during peak listening hours. Other VOA language services in the region draw significantly higher audience ratings.

"VOA Burmese will be restructured to increase mediumwave coverage. While VOA Khmer is extremely popular, the audience drops significantly during the final thirty minutes of its ninety-minute evening program. Therefore, the program will be

reduced by thirty minutes, freeing up SW and SW frequencies for other services. VOA Vietnamese will be picking up a half-hour time slot being vacated by Lao, which draws low audience ratings during that time slot.

"In the Baltics, use of the Internet continues to grow, leading VOA to believe that it can still reach large audiences – perhaps even larger than current SW audiences – by converting to an Internet service with audio feeds to local stations.

"The current review affected VOA, RFE/RL and Radio/TV Marti; Radio Free Asia was not included since it has only been in existence since 1995, and since there is insufficient audience research available.

"Radio Free Europe/Radio Liberty already reduced broadcasts by 2:30 several years ago along with considerable staff cuts. But current cuts will reduce hours in Bulgarian, Romanian, and South Slavic services, end mediumwave in Czech, convert Estonian from feed to internet.

"Radio and TV Marti are not being cut at this time, due to 'considerable support on Capitol Hill.' BBG has also suggested an additional MW frequency to counter Cuban jamming."

Sonja Pace, news director, quotes Sandy that "there will be another language review next year and others to follow in subsequent years. There was a clear wake-up call to several language services, including Brazilian, Arabic, Russian, Kurdish, Turkish, Hindi, Indonesian. He said these services need to come up with solid plans to revitalize their programming and to prove their 'impact and effectiveness.'"

Feedback

Some affected VOA employees have set up a web site protesting the reductions in which it refutes three "lies" about the services being cut: that the six European Language Services are being cut ostensibly because they are ineffective and there are no listeners in the target countries; that the cuts are "made to shift resources and broadcast hours away from stable democracies to regions of the world where information sources are more restricted"; that the cuts are not the result of a budget squeeze, nor were they the byproduct of the agency's recent attempt to expand its presence in television and on the Internet. Browse to <http://members.aol.com/savevoa/index.html> to see why the service is still needed, why the VOA is wasting money elsewhere and suggesting ways in which

you may voice your dismay to decision makers.

In the Chicago Tribune, James Warren reported:

"Members of the affected services were irate and noted no similar cutbacks at Radio Free Europe, which still enjoys strong congressional support and was long associated with the Central Intelligence Agency, especially during the Cold War."

In the Washington Times, David R. Sands reported:

"This has quickly become known as 'Black Thursday' around here," said one VOA veteran as word of the firings spread. Employees will learn by the end of June who will be let go, with the firings taking effect by the end of August.

John Figliozi opines to the swprograms newsgroup:

"Rather than carve out a unique and valuable niche for itself, the VOA has taken to mimicking CNN and every pedestrian adult contemporary radio station on the North American continent. One is hard pressed to find anything on VOA that portrays the social fabric, culture, history, business, technology, multicultural identity and political traditions of the US in its countless facets and in such a manner as to explain the near miracle that is the American experience to a world audience. Instead we have a news byte service (*News Now*) and a second rate pop music service (*Music Mix*). Talk about no imagination. No wonder the thing is dying. Maybe at this rate (and I really hate to say this) it deserves to."

Gary A. Marco, President, AFSCME Local 1418, has this reaction:

"It is my view that these cuts are bogus. The United States defines its vital interests not only by what it does but what it says. These cuts can easily be interpreted as a rollback of U.S. interests in countries affected by the cuts.

"The cuts in broadcast time to Laos, Cambodia and Vietnam are particularly disturbing. Not one of these countries can even be remotely conceived of as open societies. Yet again, some faceless bureaucrats in Washington are betraying the people in Southeast Asia.

"The Agency says that it will maintain feed services to replace the direct broadcasts being taken off the air, particularly in Polish, Hungarian and Czech. Feeds to so-called 'affiliates' is a joke. Anyone who

does broadcasting for a living knows that once the feed leaves the VOA building, control of the broadcast ends. Programs can be edited for content, broadcast at odd hours of the day or night to fill off-hours air time or even not broadcast at all.

"The rationale currently in vogue within official circles of the Agency is that the Agency has to take a 'multimedia' approach to its mission; i.e., radio, television and the Internet. That takes money. Lots of money. VOA doesn't have that kind of budget and won't have it for the foreseeable future. What this means, in my opinion, is that instead of making the effort to do one thing very well (radio), the Agency will do three things very badly (radio, TV and the Internet).

"Another thing the Agency likes to ignore are issues of vulnerability of television and the Internet. We live in a free society and take all of the communicative mediums for granted. What Agency officials don't consider, with regard to the average foreign media consumer, is the cost and/or availability of these media tools to the average citizen. Another thing that seems to be off the management radar screen is that these other mediums can be blocked or cut off. In the recent coup in Pakistan, the first thing the military went after were communications facilities, including television stations, an easily identifiable communications target. In China, the government is periodically raising the issue of blocking outside Internet access. If the government controls telephone and server facilities, this is certainly a possibility.

"Frankly, we really don't have any idea if there is even an audience for the television programs in the first place. Agency officialdom seems to believe that people are going to flock to VOA television programs just because it's VOA. I find that train of thought rather wanting in logic.

"In short, for what VOA does, there is no substitute for direct radio broadcasts over short-wave and medium wave. It's not as 'sexy' as television or as in vogue as the Internet. However, for international broadcasting and coverage over large amounts of territory, it's still the best and the most cost effective."

(Sources: VOA press release and BBG memos, *Communications World*, Chicago Tribune via Mike Cooper, Washington Times, *El Tiempo* via Henrik Klemetz, John Figliozi, Gary A. Marco; *DX Listening Digest*)

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A Glossary of radio related terms used in *Monitoring Times*. (See www.grove-ent.com/mtglossary.html for a much more comprehensive list.)

THE RADIO SPECTRUM

ULF - Ultra Low Frequency (3-30 Hz)
 ELF - Extremely Low Frequency (30-300 Hz)
 VF - Voice Frequencies (300 Hz-3 kHz)
 VLF - Very Low Frequency (3-30 kHz)
 LF - Low Frequency (30-300 kHz)
 MF - Medium Frequency (300 kHz-3 MHz)
 HF - High Frequency (3-30 MHz)
 VHF - Very High Frequency (30-300 MHz)
 UHF - Ultra High Frequency (300 MHz-3 GHz)
 SHF - Super High Frequency (3-30 GHz)
 EHF - Extremely High Frequency (30 GHz and above)

// - Indicates a Parallel Frequency

μF - Microfarad

μH - MicroHenry

μV - Microvolt

73 - Best Regards

A - Saturday

AC - Alternating Current

ACARS - Aircraft Communication and Reporting System

A/D - Analog-to-digital

ADC - Analog-to-Digital Converter

Aero - Aeronautical

AFC - Automatic Frequency Control

AFTN - Aeronautical Fixed Telecommunications Network

ALE - Automatic Link Establishment

AM - Amplitude Modulation

Amps - Amperes

APRS - Automatic Packet Reporting System

ARINC - Aeronautical Radio, Inc

ARQ - Synchronous transmission and automatic repetition teleprinter system

ARRL - American Radio Relay League

ARTCC - Air Route Traffic Control Center (FAA)

ATC - Air Traffic Control

Autodin - Automatic Digital Network

AWOS - Automated Weather Observation Station

Bandscan - A list of stations normally received at a given location (not DX)

Barefoot - Unamplified

BCB - Broadcast Band (530-1705 kHz AM band)

Bd - Baud

BFO - Beat Frequency Oscillator

BNC - Coax connector commonly used with VHF/UHF equipment

CB - Citizens Band

C-band - The spectrum from 3.7-4.2 GHz where satellite TV and other fixed satellite services are broadcast.

CDMA - Coded Division Multiple Access

CD-ROM - Compact Disc Read Only Memory

Comm - Communications

CONUS - Continental United States

CPC - Courtesy Program Committee (a group that arranges DX Tests)

CQ - General call to all stations

CRTC - Canadian Radio-Television Commission (The Canadian FCC)

CSQ - Carrier Squelch

CTCSS - Continuous Tone Controlled Squelch System

CW - Continuous Wave (Morse code)

DAB - Digital Audio Broadcast

dB - Decibel

dBi - Decibels over isotropic

DBS - Direct Broadcast Satellite

DC - Direct Current

DCS - Digital Coded Squelch

de - Morse code prosign meaning "from"

DSP - Digital Signal Processing

DTMF - Dual Tone Multi Frequency

DTRS - Digital Trunk Radio System

DTV - Digital Television

DVB - Digital Video Broadcast

DX - Distant Station Reception

DXer - A person who engages in the hobby of distant radio/television reception

DXing - The hobby of listening to distant radio or television signals

DXpeditions - DX Expeditions (trips to the boonies by radio listeners)

ECPA - Electronic Communications Privacy Act

ECSS - Exalted Carrier Selectable Sideband

EDACS - Enhanced Digital Access Communications System

ELT - Emergency Locator Transmitter

ERP - Effective Radiated Power

E-skip - Sporadic E-layer ionospheric propagation

FAA - Federal Aviation Administration

FAQ - Frequently Asked Questions

FAX - Facsimile

FCC - Federal Communications Commission

FEC - Forward error correction teleprinter system

FEMA - Federal Emergency Management Agency

FM - Frequency Modulation

FM² - FM Squared

Freq - Frequency

FRS - Family Radio Service

GHFS - Global High Frequency System (U.S. Air Force)

GHz - Gigahertz

GMDSS - Global Maritime Distress and Safety System

GMRS - General Mobile Radio Service

GMT - Greenwich Mean Time (has been replaced in most applications by UTC)

GOES - Geostationary Operational Environmental Satellites, US geostationary weather imaging satellite constellation

Golay - Golay Sequential Pager Signaling System

GPS - Global Positioning Satellites

HT - Handi Talkie/Handheld Transceiver

I - Current (measured in amperes)

IBB - International Broadcasting Bureau

ID - Identification

IF - Intermediate Frequency

IFR - Instrument Flight Rules

IRC - International Reply Coupon

IRCA - International Radio Club of America

ISB - Independent Sideband

ITU - International Telecommunication Union

kHz - Kilohertz

Ku-band - 11.7-12.2 GHz (plus 12.2-12.7 GHz in North America)

kW - Kilowatt

LCD - Liquid Crystal Display

LDOC - Long Distance Operational Control

LED - Light Emitting Diode
 LNA - Low Noise Amplifier
 LNB - Low Noise Block Downconverter
 LNBf - Low Noise Block Downconverter Feedhorns
 LPFM - Low Power FM (United States)
 LPON - Low Power Open Narrowcasting (Australia)
 LSB - Lower Sideband
 LW - Longwave (150-300 kHz)
 mA - Milliampere
 mA/h - Milliampere-hours
 MARS - Military Affiliate Radio System
 MDT - Mobile Data Terminal
 Meteo - Meteorological
 MFA - Ministry of Foreign Affairs
 MFSK - Multi Frequency Shift Keyed
 MHz - MegaHertz
 MPEGII - Digital video compression technique
 MSK - Minimum Shift Keying
 MT - Monitoring Times
 MUF - Maximum Usable Frequency
 mW - Milliwatt
 MW - Medium Wave (typically 530-1710 kHz)
 MW - MegaWatt
 NAB - National Association of Broadcasters
 NAM - Narrowband Amplitude Modulation
 NASA - National Aeronautics and Space Administration
 NATO - North Atlantic Treaty Organization
 NAVTEX - Navigational Text (broadcast on 518 kHz)
 NCS - National Communications System/Net Control Station
 NDB - Non-Directional Beacon
 NECN - National Emergency Coordination Network
 NFM - Narrowband Frequency Modulation
 NiCd - Nickel Cadmium Battery
 NiMH - Nickel Metal Hydride battery
 NOAA - National Oceanographic and Atmospheric Administration
 NPRM - Notice to Proposed Rulemaking
 NWR-SAME - National Weather Radio Specific Area Message Encoding
 Nx - News
 Op-amp - Operational Amplifier
 Ops - Operations
 OTHR - Over The Horizon Radar
 P - Power (measured in watts)
 Packet - Amateur radio error correcting mode
 PACTOR - Teleprinter system that combines certain aspects of packet and SITOR.
 PAL - European TV broadcasting standard utilizing 625 scanning lines
 PC - Personal Computer/Printed Circuit
 PCS - Personal Communication System/Satellite
 PFC - Prepared Form Card
 PL - Private Line
 PLL - Phase Locked Loop
 POCSAG - Digital Pager Code
 PSK - Phase Shift Keying
 PSTN - Public Switched Telephone Network
 PTT - Post, Telegraph and Telephone Administration
 Q - Performance rating regarding selectivity or bandwidth
 QRM - Interference from another station
 QRN - Interference from natural or man-made sources
 QRP - Low power operation
 QSL - A card or letter confirming reception of a radio station
 QSO - Communications between two or more stations

QTH - Location
 R - Resistance (measured in ohms)
 RAM - Random Access Memory
 RDF - Radio Direction Finding (or DF)
 RF - Radio Frequency
 ROM - Read Only Memory
 RTTY - Radioteletype
 SASE - Self Addressed Stamped Envelope
 S-band - Microwave frequencies above UHF
 SCA - Subsidiary Carrier Authorization (now known as SCS)
 SCPC - Single Channel Per Carrier
 SCS - Subsidiary Carrier Service
 SECURE - State Emergency Capability Using Radio Effectively
 SELCAL - Selective Calling
 Sesqui - Combining form meaning one and a half of something
 SHARES - Shared Resources (U.S. government traffic network)
 SIM - Subscriber Identity Module
 SINAD - Signal to noise and distortion ratio
 SINPO - A code system used by radio hobbyists to indicate how well a station was received: S=Strength, I=Interference, N=Noise, P=Propagation, O=Overall
 SITOR - Simplex teleprinting over radio system, modes A and B
 S-Meter - Signal Strength Meter
 SMR - Specialized Mobile Radio
 S/N - Serial Number
 S/N Ratio - Signal-to-Noise Ratio
 SNG - Satellite News Gathering Unit
 SPST - Single Pole Single Throw (switch)
 SQL - Squelch
 SSB - Single Sideband
 SSN - Sunspot Number
 SSTV - Slow Scan Television
 SW - Shortwave (high frequency - HF)
 SWBC - Shortwave Broadcast
 SWL - Shortwave Listener
 SWR - Standing Wave Ratio
 TDMA - Time Division Multiple Access
 TIS - Traveler Information Service
 TRACON - Terminal Radar Approach Control
 Tropical Shortwave Bands - 2300-2495 kHz, 3200-3400 kHz, and 4750-5060 kHz
 TVRO - TV Receive Only
 TWEB - Transcribed Aviation Weather Broadcast
 UKoGBaNI - United Kingdom of Great Britain and Northern Ireland
 Unid - Unidentified
 USB - Upper Sideband
 UTC - Universal Time Coordinated
 Vac/VAC - Volts Alternating Current
 Vdc/VDC - Volts Direct Current
 VFO - Variable Frequency Oscillator
 VFR - Visual Flight Rules
 VOLMET - Aviation Weather Broadcasts (on HF)
 VOX - Voice Operated Relay
 WAM - Wideband Amplitude Modulation
 WEFAX - Weather Facsimile
 WFM - Wideband Frequency Modulation
 WWW - World Wide Web
 Wx - Weather
 WXSAT - Weather Satellite
 X-band - Expanded AM broadcast band (1610-1700 kHz)
 Zulu - Military time zone (same as UTC)

Skip Arey, N2EI
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Spring Reading

Every April, it has become tradition that I take the time to share some of the great books that I have read in the last year. This year brought a bumper crop of great selections. It was hard to pick the few I could put in the pages of *MT* this year.

For example, each new year brings us a new edition of :



**PASSPORT TO
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<http://www.passband.com>

I sometimes wonder what is left for me to say about *Passport* other than "buy it because you really need it to do this hobby right." But each year my former *MT* colleague Larry Magne and his staff come up with new ideas and information worth noting here in the pages of *MT*.

One of the things that Larry really doesn't get enough credit for is *Passport's* ability to bring new people into the hobby. To some degree, *Passport* has always had enough introductory information that a person could take it down from a bookstore shelf and go home and enjoy shortwave listening.

Oh, they'd need to get their hands on a shortwave receiver, but all the information needed for this can be found in each edition of *Passport* as well. This latest edition's "Complete Idiot's Guide to Getting Started" could be distributed as a separate pamphlet to get folks hooked on our hobby. For those of us already well involved in the shortwave world, these pages could be used to explain our obsession to spouses, significant others, bosses who wonder why you wander in an hour late and all bleary-eyed, etc.

This year's edition includes a series of fine feature articles authored by Manosij Guha that concentrate on Central Asian radio, especially in the areas of Afghanistan, Tajikistan, Uzbekistan, Kyrgyzstan and Kazakhstan. Personally I have not been a big Central Asian DXer, but these articles have me tuning around with aroused interest. The socio-political and religious issues of this region bear watching. One of the greatest things about our hobby is that when folks at our jobs begin to talk about a news event, chances are we have already been following it. Our ability to do this is in part thanks to books such as *Passport to Worldband Radio*.

The 2000 *Passport's* reviews of portable and desktop receivers continues in the high standards of years past. There appears to be a growing trend toward pocket-sized shortwave rigs. Also there is a breakout section for what *Passport* calls "Portatop" receivers such as the Drake SW8 and the Lowe HF-150.

Another great feature is the first large scale coverage of the "black box" PC-controlled receivers. This is a growing market and innovations in both the areas of hardware and software are worth following by any serious enthusiast. Also examined is the growing market of "emergency" radios, many with alternative power sources.

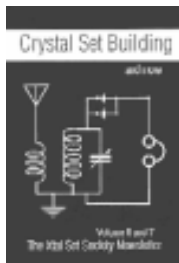
I was also pleased to see coverage given to the Ten-Tec Model 1254 kit receiver. Home built receivers may be wanting in some levels of performance but it is still fun to put something together and have it work when you are done. Larry and his staff help sort out style and substance on every class of receiver that a new or experienced listener might be interested in, so that the reader can make an intelligent purchase.

Next comes the section of the book I probably use most throughout the year. "What's On Tonight" is truly a shortwave hobbyist's "TV Guide." *Passport's* selections point the listener to programming that is always a cut above the average. This, along with the "Worldwide Broadcasts in English" section will provide any listeners with hours of fun and entertainment.

If you enjoy QSL collecting you will find this year's "Address Plus" section to be very comprehensive with many good tips and suggestions. There is a section on "Tips for Effective Correspondence" that helps the reader learn how to use proper international etiquette when writing to stations.

Finally, we come to one of the best tools a DXer can have: the *Passport* "Blue Pages."

Every year one of the first things I do when I get my new *Passport* is to go through the Blue Pages working out my "Hit List" for those countries that I want to add to my log. The Blue Pages are also a great tool for trying to ascertain what a signal might be during a band scan or random tuning.



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As most of you know from the December 1999 issue of *MT*, I have a tattoo of a crystal set schematic on my left shoulder. The inspiration for this particular piece of body art came from the pages of The Xtal Set Society newsletters.

I have been a member of this organization for quite some time now. If you have any interest in building very basic receivers that can perform remarkably well (yes, even in the shortwave frequencies) you may want to give these folks a look at their website www.midnightscience.com or e-mail them at xtalset@midnightscience.com.

This is real "roots" radio that can be a lot of fun: just the ticket for beginners. The organization makes a point of publishing their collective newsletters periodically and these books are well worth the cover price. One of their recent collections is:

This compilation of Volume 6&7 of the society's newsletters includes some of the most intriguing receiver designs I have seen in a long time. Many of these circuits stretch the mind as you begin to discover some of the amazing ways radio signals can be detected. For example, included is a study of how you can use a propane torch as a detector!

Or maybe your tastes run more toward carbon and steel detectors which were the basis of "Foxhole" radios that are nearly legendary in radio discussions. The book's articles are all well illustrated, as it is always the intent of the society to have the published designs built by their membership.

This collection begins with a very interesting study of how FM signals can be detected with a crystal set. The work in this area (by member Edward Richley) is downright scholarly. A number of the designs in the book are shortwave receivers. Anybody can log a SW station with a high dollar commercially produced general coverage receiver. Why not take a more sporting route to the DXing hobby and try your hand at logging some rare ones with a homebrew receiver constructed with a minimum of parts?

The society sometimes includes designs that go a bit beyond basic crystal set circuits. This compilation includes a very nice design for a J-FET based Regenerative Shortwave receiver as well. It also includes a number of TRF (tuned radio frequency) receiver designs that demonstrate very high performance with minimum parts count.

A word of warning: This basic radio stuff is highly addictive. Don't be surprised if you find yourself forsaking your current commercial rig for something you can proudly say you made with your own hands!



AM BROADCAST ANTENNA SYSTEMS: A BASIC GUIDE

by Patrick M. Griffith NONNK
65 pages

Morris Publishing
Kearny, NE

ISBN: 0-7392-0085-2

Direct sale offer by the author
\$12 plus \$3 shipping and
handling to:

Patrick M. Griffith
PO Box 211374
Dept. AM
Denver, CO 80221

As many of you know, my radio hobby interests run rather eclectic. Periodic Sunday night insomnia lends itself well to AM broadcast band DXing. But even if you don't spend late night hours trying to pull in standard broadcast band signals that were never meant for your ears, you may still have an interest in this book. If you have done any traveling more than a few miles from home, you have no doubt seen any number of radio broadcast transmitting towers. Just what are those antennas designed to do? Are they more than a substantially larger version of the whip antenna attached to your car?

Well, Patrick Griffith has come along with a book to make this topic understandable to any radio hobbyist. Up until now, the only

books I have seen available on this subject were advanced engineering texts beyond the scope (and wallet) of most radio hobbyists.

The book begins with a brief study of propagation as it relates to the needs of AM broadcasters. This in and of itself gives any beginner a good idea of how AM Broadcast signals travel. Next comes an explanation of the various classes of AM stations and the FCC rules that govern their operation. This is followed by a discussion of past and current AM antenna design, centering on the more common guyed and self-supporting vertical structures used by stations around the country. This section, as well as many others, includes excellent, black and white photographs of station tower sites around the United States.

The topic of how these antennas are fed is covered in great detail. These folks just don't run down to the local Radio Shack for a roll of RG-58! Once the reader gets a handle on basic vertical antennas, the book goes on to discuss the various directional antenna arrays that are used to keep a station in compliance with its FCC license and get its signal to its target audience.

The book goes on to discuss some more recent developments in broadcasting such as multiplexing more than one station's signal through a single antenna or array. The book's appendix includes a number of interesting

Internet sites that are useful to any radio hobbyist. If you want to resolve any curiosity you may have about those antennas you pass on the highway, give Patrick's book a look.

INSIDE AMATEUR RADIO

by Lenore Jensen W6NAZ

93 pages

\$9.00

Worldradio Books

2120 28th Street

Sacramento, CA 95818

And finally, here's a neat little book full of great stories.

Every time a group of hams or any kind of radio people get together, there are often a couple a stories told about how amateur radio saved a life or helped out in some kind of emergency. This brief book is a collection of some of the best amateur radio anecdotes I have ever come across. The book contains five action-packed chapters covering: disaster and emergencies, phone patches, wartime, medical assistance and personal anecdotes.

The book makes for great light reading and you will come up with a story or two that hits close to home. At the very least, you'll have a few new tales to tell next time you gather with your radio hobby buddies. It's a great book to remind everybody that the radio hobby is sometimes more than just a lot of fun.

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Revisits

Vertical or Horizontal Antenna?

In our January column, we pointed out that an active antenna for shortwave reception may be mounted in either the vertical or horizontal plane for reception since long distance signals are mixed in their polarization.

While this is true, Deborah Proctor ("WCPE Takes Broadcasting to new Heights," same issue) points out quite correctly that, since most electrical interference on the bands is vertically polarized, a horizontal receiving antenna is preferable.

In actual practice, it would be wise for an installer to test reception of weak signals on a variety of signals, with the antenna in a variety of positions, before permanently securing it. Thanks, Deborah.

Car Battery Storage Revisited

Several months ago, a reader asked whether there was any truth to the caveat that a car battery should never be stored on a cement floor. We could find no rationale for this old legend, so we replied that it wasn't valid. Now an interesting theory surfaces.

According to Dan Metzger in his January/February 73 magazine article, *Read All About it*, nighttime temperatures in a garage may dip considerably lower than the constant floor temperature. This causes the electrolyte (acid) in a floor-stored battery to have a temperature gradient, and thus a voltage gradient, between the upper and lower parts of the cell plates resulting in an internal self-discharge.

Dan says that placing the battery on a Styrofoam block heat-insulates the battery from the floor, preventing the phenomenon. Interesting thesis.

Q. Since there are thousands of languages and dialects among the peoples of our planet, are we likely to hear all or most of these on short wave? (Donald Michael Choleva, Euclid, OH)

A. Not by a long shot. As with any fund-sponsored project, broadcasters try to get the "biggest bang for the buck." In other words, they need to reach the masses.

Of those thousands of languages and dialects, a considerable proportion belong to tribes uninterested in listening to shortwave and of minor economic impact on their host countries. While there are undoubtedly limited domestic services available to some of them, they would not have an outreach on shortwave.

Q. I am concerned about interchanging "wall wart" power supplies to run my classic Zenith Trans-Oceanic radios for fear of damaging the radios' circuitry. For example, while my radio calls for a 12 volt supply, many of the little power cubes show 17 volts or so on a meter before they are plugged into the radio. Is this a valid concern? (Gabe, Glen Ellyn, IL)

A. While your concern is understandable, it is probably overly cautious. Regulated power supplies which deliver constant voltage under various current load conditions are virtually absent from the portable radio world. It is more important to provide an AC adaptor which has a current rating close to that of the radio. This insures that the voltage will drop to near the proper value when it is powering the radio.

For example, if your radio is designed to operate at 12 volts and requires 200 mA (milliamperes) of current, then a 12 volt power cube rated at 200-250 mA is far more likely to drop to around 12 volts under load than a huskier power supply rated at 500 mA.

Using similar logic, don't underpower the radio; a 12 volt power cube rated at 100 mA is likely to drop below 12 volts when used with the 200 mA radio.

Q. I have heard many reports of people living near broadcast transmitters hearing music on their toasters, voices in their heads, and watching fluorescent lights come on by themselves. Is any of this true? (Mark Burns, Terre Haute, IN)

A. All of it is true. Dissimilar metal junctions such as wiring in a toaster and fillings in a tooth can act like the crystal detector in early

radios; the resulting voice/music currents can cause the toaster to "sing," or the auditory nervous system to respond to the modulating frequencies as well.

The high voltage electrical field produced by the transmitting antenna will also ionize nearby gasses such as those in the fluorescent tubes, causing them to glow. This method was used by early hams to test the output of their own transmitters; early experimenters used neon bulbs, while later on fluorescent tubes were (and are) also used.

Q. What is the difference between my Sangean Anniversary Special Edition ATS909 and the standard issues of that portable receiver? (Joe Magnano, East Hampton, CT)

A. Cosmetics only; it is a standard ATS909 packaged in a silvered case to commemorate Sangean's Silver Anniversary.

Q. I have a cable-ready Samsung TV, but it's hooked to an outdoor antenna system. Occasionally I enjoy browsing through the cable frequencies just to see what's there. Imagine my surprise when I suddenly saw on channel 57 NASA's Houston control room bringing the Shuttle back to earth, with "W7ATV/R" in the upper right-hand corner of the screen! What was I watching? (Bill Scott, Phoenix, AZ)

A. W7ATV is licensed in the amateur radio service in neighboring Glendale, Arizona; the /R indicates that it is a repeater. Channel 57 is a cable channel corresponding to the 420 MHz UHF ham band, commonly used for amateur TV. They are authorized to re-broadcast audio and video of a Shuttle mission.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove-ent.com

Gary Webbenhurst
ab7ni@arrl.net

Leashing the Internet

My theme for hints and tips this month deal with the Internet. My fellow columnists do a very good job of suggesting sites of special interest to those in the monitoring hobby. What I offer are tips to make your Internet surfing more productive. I make the assumption that you have basic computer/internet skills. Even if you don't, read on, and you will be hooked. The Internet has forever changed the hobby of monitoring.

17 If you have daily access to the Internet, you are lucky. If not, you need to find a friend who can give you time online. A last, but perfectly good, alternative is your local library. If you use a friend or the library, bring some paper for printouts of desired information. A 3.5-inch disk will allow you to copy small amounts of information electronically for future retrieval.

18 You need an Internet strategy. There is so much information available on the net, you can soon become disorganized. What do you seek from the Internet? Frequencies? Information on trunked radio systems? ID talkgroups? You can soon find yourself with dozens of pages of frequencies for states and cities you have never even heard of before. Perhaps you are interested in buying books, scanners, or accessories.

I suggest you thoughtfully set up some computer directory structure before you start surfing the Internet. For those already deep into the Internet search game, it may be time to reorganize your files.

I suggest you establish a set of folders on your computer or disk: national frequencies, trunked radio systems, equipment dealers and product reviews, and your local frequency lists. As you can imagine, each of these folders can have many sub-folders. Under my national frequencies, I have all fifty states, plus Canada – do whatever fits your needs and interests.

19 The Internet is a vast system of millions of documents, called websites. The main tool for utilizing the Internet is a "search engine." Examples are msn.com, yahoo.com, excite.com, and altavista.com. These treat the Internet as a database and search pages in its known database. Not every search engine knows about every website. If you don't find what you need, try a different search engine.

20 OK, you found the information you wanted; now what? There are several ways to retain your findings. If you are on your own computer, you can go to File, Save As, and designate a

directory and name for the file. If you use a friend's computer, ask him/her if you can set up your own private directories. If you need to, you can save the file to your 3.5 floppy disk (probably in the a: drive), but remember that disk has very limited storage space.

You can select File, Print, but webpages have many colors, bells, and whistles that you don't need; to print text only go to Edit, Select All, File, then Print. You can also highlight the text by clicking Edit, Select All and then save your highlighted text to a file and directory you designate.

I like to keep the information in electronic form so I can later manipulate it for my own personal needs. I keep my word processor open with a blank page. I can then Select All, Copy, and click on the box at the bottom of the screen to switch to the word processor. Then I select Edit, then Paste. The copy and paste function is a powerful tool. Master it!

21 I subscribe to many e-mail lists such as Fedcom and Trunkcom. Watch *MT* or search around the internet and you'll soon find out how to subscribe to these free message services. Again, I can highlight, copy and paste. Sometimes it is just as easy to make a handwritten note for that single frequency. I can update my files later.

22 Don't limit yourself to scanner related pages. I find a great deal of information on other topics. My personal interest is wildland fires. There are now many Internet websites with public safety related information from many different agencies. An example of a related one is the fire fighting crew "Hot Shots" at www.fs.fed.us/r6/mthood/zzihc/default.htm

23 Do you enjoy listening to organized radio nets? Visit the ARRL website at www.arrl.org. Look for the Net Directory.

24 Did you find an interesting photo or graphic while surfing? You can place your cursor over the object, then right click the mouse, and a box of options pops up. Select "save as a picture" and then designate a meaningful name and directory.

25 Free books related to Firefighting/EMS - www.usfa.fema.gov/usfapubs/index.cfm. That's right FREE. You and I as taxpayers paid for these books. But don't get pissy.

Use the Shop/Order icon to move to the index page. Select the items you wish, add them to your shopping card and then submit a U.S. order. No charge.

26 There is one Internet website for radios and scanning that is simply head and shoulders above the rest. Log on to www.strongsignals.net/ This site can take many hours to fully explore.

For starters, I suggest you read (or download) the New Users Frequently Asked Questions (FAQ.) Explore every subsection it lists. Every time you click on this site, it leads you to many more pages of fascinating information.

27 When you find a really good webpage, save it. You can click on Favorites or Bookmarks and then save it to an appropriate folder. (Remember to establish a good list of folders for your favorites.)

28 For really important websites, you can highlight the Uniform Resource Locator (URL) on the address line, then drag it to the Links bar immediately below. That way it is always just one click away. I suggest the strong signals site!

Note: The Internet is a dynamic and ever-changing environment. New websites appear daily and some disappear without notice. All these sites listed were accurate when submitted for publication. My Internet software is Microsoft's Internet Explorer, but AOL, Netscape and others are all similar.

Next month we offer tips on preparing for summer holiday scanning. We welcome your ideas, tips and questions. See you next month.

Hot Internet sites for scanner enthusiasts: <http://>

www.eskimo.com/~joelm/fire/index.html
hotcity.com/911
hamradio.mail1.com
www.neotecinc.com/new/prod_serv.html
www.loras.com/frequencies/queries/freqform.asp
www.uams.edu/chrp/dmatweb.htm
webserve.dma.state.ky.us/test5.htm
www.bigpages.com/dmatca9
www.excltees.com/fire.html

Wildland fires
Fire/EMS
Radio mods/enhancements - Example of a good project
ICS/Training
List of state radio frequencies
Emergency Operations Center (EOC) and related links
Excellent site!
Disaster Medical site
Fire Links at the bottom the main page



The Passing of Two Scanner Heroes

It has been a very sad start of the new year for the scanning community. Two well-respected people, who had long been critical to the health of our industry and hobby, have passed away.

George Switlyk, who died suddenly at the age of 71 in early February, had more to do with the growth and success of scanning than most, yet relatively few in the hobby knew who he was. George was a partner, along with Gene Hughes and myself, in *Police Call*. In the early 1970s, Gene, who had been writing his Southern California guide for some time, approached George about doing a national publication.

In these early days of scanning it was extraordinarily difficult to acquire frequency and license information. At best, you could visit one of the Federal Communications Commission (FCC) offices and view microfiche of licenses on cumbersome readers. This was a painstaking process that only told you what frequencies a community had licensed, but not how the frequency was being used.

George had been one of the pioneers in the computer industry. He bought one of the first UNIVAC machines from the Massachusetts Institutes of Technology (M.I.T.), had the punchcard-driven behemoth shipped to New Jersey and put it to commercial use updating mailing lists for major magazines. Later George worked on putting selected FCC services in computer databases and selling those lists to two-way radio vendors. Gene learned of George's expertise in the computer database and radio fields and set up a meeting in Washington, DC. They met, became partners, and began the national rollout of *Police Call*.

I had the privilege of joining Gene and George in the production of *Police Call* a few years ago. I came to know George as not only a brilliant man, particularly with numbers and computers, but also a kind person who was filled with wonderful stories of his family and varied business ventures. I don't believe he ever fully appreciated how much his work meant to the evolution of scanning.

Without his and Gene's work, the development of the programmable scanner would never have meant as much as it did. If you didn't have a source to look up licenses there would be little point in searching for or programming distant communities into your radio. Everyone might as well have stuck with crystal sets. The combination of the programmable scanner along with *Police Call* created a boom for the industry.

Our sincere condolences to George's wife Marilyn, as well as to George's children and grandchildren. We'll miss you, George, and be forever grateful for your work and your friendship.

Carol Ruth died of cancer in January. Carol Ruth was the managing editor of the RCMA (Radio Communications Monitoring Association) for many years. Carol was the glue that held that organization together during tight financial times, executive in-fighting, missed editorial deadlines, and more. Anyone who knew Carol marveled at how such a soft-spoken, caring woman could put up with so much guff from us ornery scanner guys. The RCMA helped foster intense interest in the intricacies of scanning and was the precursor to the scanner publications and websites of today. She'll be sorely missed.

ReLM buying Uniden's two-way business

A story broke publicly just before press time that RELM Land Mobile Radio was negotiating to buy Uniden and Midland's two-way businesses. While this does not really affect us scannists, it is an interesting turnabout of sorts.

RELM was formerly Regency Electronics (or at least a portion of it was). Uniden bought Regency's scanner business back in the 1980s. Uniden selling its two-way line can only mean one thing, though, and this is important: An even greater focus for Uniden on its core consumer electronics business (as opposed to any commercial businesses such as its land-mobile line). Consumer electronics includes cordless phones, CB, radar, marine radio and, of course, scanners.

Scanning Databases in the Palm of Your Hands

Jim West was kind enough to send in the following terrific idea. "Just wanted to pass along a neat idea for anyone out there with a Palm Pilot. It is relatively easy to create a frequency database and put it on the Palm for reference wherever you go.

"First you need to get the Mobile DB Light program and install it on the Palm. This allows you to view, sort, filter and find records on databases for the Palm. You also need to get a free converter program and install it on your PC. This will allow you to take a HTML or comma separated variable file and convert it to a format that the Palm will understand. You can get these files at www.mobilegeneration.com.

"I uploaded frequencies from my AR8000 scanner using ARC for Windows. Then I pasted them into a spreadsheet. I used Works, but others will work too. This was a little awkward since I had to do it one bank at a time. You could also just type them in instead

An Important Clarification

In the February issue we evaluated the PRO-92 scanner against the BC-245. In the article, Brian Cathcart (aka The Scanner Dude), provided a detailed comparison of the two radios in which he demonstrated the Uniden's superior ability to track Motorola trunking. In his report, Brian compared the PRO-92's trunk-tracking performance to the Optoelectronics Optocom. Brian stated that, like the PRO-92, the Optocom utilized slow-speed handshaking (as opposed to Uniden's control-channel method) for tracking Motorola trunking. This was not entirely accurate and we would like to clarify the matter.

The Optoelectronics Optocom (with the "bit-banger" installed) actually does provide the capability for control channel trunking. Greg Knox, the inventor of Motorola control channel monitoring, sells his sophisticated *Trunktrac* software (available from Scanner Master at 800-722-6701 and scannermaster.com) to work specifically with the Optocom, as well as ICOM and Uniden scanners. With *Trunktrac* and the Optocom, you can follow up to four Motorola systems at one time and view an extremely comprehensive screen which even any communications systems manager would envy. *Trakkstar* from Scanstar also works with the control channel fed from Opto's receiver.

of uploading them (I'm sure we all have a bunch of paper scraps with frequencies....). But in the end, I had a big spreadsheet of all the frequencies, channel, bank, text, and comments that I added to the spreadsheet. Then I just saved the file as a comma separated variable file (.csv extension).

"Then I ran the Mobile DB converter program that opens the .csv file. I think you can also directly import HTML files, but I didn't play with that. You also have to play around with the adjustments for the column widths to get it to look right on the Palm. The converter has a window where you can edit the data. Then you convert the file and save it as a file for the Palm. This file then gets hotsynced to the Palm.

"All together this took a couple hours – but would probably be quicker the next time around. I think my next attempt will be to grab the FCC database for all transmitters in my county and create a database of that on the Palm."

245 Keyboard Lock

Every couple of weeks we'll hear from a user who is completely stumped by a condition in which he finds his BC-245 Trunktracker II. The user is completely unable to make the radio do anything he wants. The keypad has become totally useless and when he tries to disable the keyboard lock function (by pressing and holding the DELAY key which shows the key icon above it), the radio continues to disregard his commands.

What the user has done is inadvertently placed the radio into REMOTE mode. In Remote mode the radio expects to be put under computer or SmartScanner control and, as such, will not respond to any keypad commands. You can tell the radio is in Remote mode and not under keyboard lock, by watching the key icon the 245 display. If the icon is steady, keyboard lock is on. If the icon is flashing, the radio is in Remote mode. Simply press and hold the E key to restore the radio to its normal condition.

Scanning Films

Returning to our long-running treatise on scanners in the mass-media, we finally got around to watching one of last year's hit movies, "There's Something About Mary." If you haven't seen it yet, scanners once again play a role in a major motion picture, and once again it's not flattering. There's a scene in which a group of women sit around a

coffee table filled with scanners, both handheld and base, listening to telephone calls.

We had heard stories five years ago of people in Hollywood who would create parties around cell monitoring. That's essentially no longer realistic, what with the number of cell sites, call hopping, and most importantly, digital phones – not to mention cell blocked scanners. The movie was certainly funny, though.

Connecticut Cops a Digital Attitude

Peter Miller, W1AMJ, wrote us with the following information on the progress of the new Connecticut State Police radio system: "You might want to publish some facts concerning the new Digital 800 MHz radio system operated by the Connecticut State Police. At least three of the 10 troops have switched over from the old low band channels in the 42 MHz range.

"The bad news for scannists is the new system is digital and therefore not trunk trackable by any existing receivers. The troops

that have already switched (Troops G, I and A) are maintaining low band for now, because some of the small town police departments who are state-dispatched have not installed the new radios yet. Also some of the small towns are protesting the high cost of the switchover.

"As far as quality, troopers using the new system are said to be quite happy with the coverage and audio quality. Plans are to phase in on-board data terminals at some point in the future."

Hawaiian Scanning

Hawaii is not only a great place to visit, it's also a fun place to scan (although if you're on vacation, try to not play with your radio too much in front of your wife or husband – they probably can only take so much).

While you might think an island would not require any fancy radio systems, you would be sorely mistaken. While Hawaii doesn't have to worry about stations in other states interfering with their communications, the population has grown to such an extent,



TrunkTrac®
New Version 5.2

TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

Competing products cost more, don't decode the control channel, can't deal with Type I fleet maps, and won't properly decode many Type II talk groups. TrunkTrac's patented technology let's you do all that and much more. TrunkTrac consists of easy to use menu driven software, an FCC Class B approved signal processing board you plug into an ISA slot in your PC, a serial interface, and a discriminator buffer for your scanner. Everything you need, including cables, is supplied. With TrunkTrac you'll have access to Private Call and Interconnect activity and can follow up to four systems at once. Any combination of VHF/UHF/800/900 MHz systems, including FED-SMR trunking, is supported. TrunkTrac lets you assign a 35 character alpha tag (up to 1000/system) to all IDs. You can set Lockouts, Personality Files, Scan Lists, and much more. TrunkTrac lets you log system activity to an ASCII file for database import and traffic analysis. We think you'll like TrunkTrac so much it comes with a 30 day money back guarantee. And For a limited time, when you purchase TrunkTrac, we will install the discriminator mod in your scanner for free.

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Scanner Master PO Box 428, Newton Highlands, MA 02161 1-800-722-6701
www.scannermaster.com

particularly in Honolulu, that large trunked systems have been implemented for radio efficiency.

Your intrepid scanner editor recently spent a week in Maui and Kauai, as well as a brief time at the Honolulu airport, scanning the warm ether. We had in hand information on a mammoth, citywide Ericsson EDACS trunking system. The data came from what is, by far, the best site for Ericsson radio system information on the web, <http://gtrac.ztn.net>.

We had heard at one time that the Honolulu/Oahu system was designed to be digital, but all comms were analog. Signal strength was excellent and the police action was fascinating. Honolulu is a major city and quite enjoyable to monitor. Our Bearcat 245XLT TrunkTracker II performed flawlessly throughout the trip monitoring Ericsson and Motorola trunking, in addition to conventional communications.

Honolulu Ericsson Trunking Radio System

(with Logical Channel Number order)

HI Honolulu -- A System	HI Honolulu -- D System
01 866.2500	01 867.2500
02 866.7500	02 867.5875
03 867.0625	03 867.7500
	04 868.0625
	05 868.3125
HI Honolulu -- B System	HI Honolulu -- E System
01 866.3375	01 866.0375
02 866.5875	02 866.5375
03 866.8375	03 866.8125
	04 867.0375
	05 867.4125
	06 867.5625
	07 867.7875
	08 868.0375
	09 868.2875
HI Honolulu -- C System	
01 866.3875	
02 866.6375	
03 866.8875	
04 867.1375	
05 867.3875	
06 867.6375	
07 867.8875	
08 867.9125	

We didn't have time on the short layover to log IDs, but it was quickly obvious that, using the standard AFS mode, that "02" was the police agency fleet. By just entering 02 into the Uniden scanner, we were able to screen out all non-public safety communications.

Kauai County

Kauai operates a Motorola Type II trunking for its island-wide communications on the following frequencies:

866.050, 866.100, 866.300, 866.600, 866.800, 867.100, 867.300, 867.550, 867.600, 867.800, 868.050, 868.100, 868.3000 868.5500 868.600, 868.800, 868.850

A few of the Kauaian talkgroups:

48 County Police

112 County Police
144 County Fire

Maui County (and surrounding islands)

Maui County is licensed for a Motorola trunked system, but the communities on the island still use VHF and UHF conventional radio systems. Below is a list of frequencies from personal monitoring and a local Radio Shack store manager:

155.190	Police, statewide common
155.670	Wailuku Police
155.685	Wailuku Police
155.550	Wailuku Police Car-to-car
155.790	Hana Police
154.770	Hana Police secondary
155.730	Lahaina Police
154.725	Lahaina Police
155.850	MCC Jail
155.580	Molokai Police
155.805	Fire
155.955	Fire
453.300	Maui County Sheriff
154.385	Big Isle Ambulance and Fire
154.310	Big Island Fire
453.400	Big Isle Ambulance
460.500	Medicom
453.700	Medicom
453.250	Civil Defense
155.715	Civil Defense
154.995	Forest Conservation (also: 154.980, 154.085, 155.025)
155.820	County Lifeguards
154.965	State Lifeguards
156.900	Green Harvest Helicopters
122.850	Mercy Air (also: 853.4875, 861.3875)

Marine Operations

156.300	Coast Guard Channel 6 Safety
157.100	Coast Guard Channel 22 Advisories
157.150	Coast Guard Channel 23 Lahaina
156.850	State Marine Patrol
156.900	Young Brothers Tugs
156.450	Matson Tugs
161.900	Marine Operator
156.425	Ship to Ship
159.195	Hawaii Department of Transportation
162.400	NOAA Weather (Haleakala)
162.550	NOAA Weather (Oahu)

Aircraft Operations

118.700	Maui Tower
125.000	Maui Tower
128.600	Approach/Departure Control
127.800	Approach/Departure Control
126.700	Approach/Departure Control
121.900	Ground Control
123.450	Search & Rescue
122.850	Air to Air
122.900	Air to Air
460.725	United Airlines
129.900	Aloha Airlines
460.700	Aloha Airlines
453.325	Airport Security (also: 453.750, 155.760)
129.300	Hana Tower

Miscellaneous

463.300	Central Transportation
155.820	Water Department
153.440	Maui Electric
155.400	Maui Memorial Hospital
155.490	Maui Land & Pine
152.300	Harbor Lights
152.390	Alii Taxi



461.800 Maui Prince Security
858.862 Federal Express
461.275 Kapalua Security
464.525 Amfac Security
463.600 Wailea Security
(also: 463.950, 464.200)

Haleakala National Park

At over 10,000 feet, magnificent Haleakala National Park is required viewing when you visit Maui. The ranger station atop the dormant volcano is crowned with a yagi pointed down at other ranger offices. At this elevation, it has to be one of the highest manned radio sites in the nation. Two frequencies are used: 169.550 and 170.010.

A National Park ranger was kind enough to pose for me with her radio inside of her station. She said she had been asked many things in her day, but this was the first time anyone asked her to pose with her radio!



National Forest Service Ranger



The yagi antenna at the Haleakala Volcano ranger station



Larry Van Horn

larry@grove-ent.com

Southern California/Mexico Aero Freqs

The following frequencies were monitored aboard a Mexican Boeing 757 on a recent three hour trip from Los Angeles to Guadalajara, Mexico; courtesy of Hector.

121.750 Los Angeles International ground control
120.950 Los Angeles International tower
124.300 Los Angeles departure control
134.350 Los Angeles center
132.850 Los Angeles center
119.950 Los Angeles center
128.300 Mazatlan center (pilot switched to Spanish)
128.000 Mazatlan center
124.200 Mazatlan center
120.800 Guadalajara approach control
118.100 Guadalajara tower
121.900 Guadalajara ground control

Central Florida Military Air Frequencies

My old buddy Jack "The Grunt" NeSmith, passes along the following military aircraft frequencies recently monitored in central Florida (my additional notes in parenthesis).

228.800 Oakgrove (SE Air Defense-Tyndall AFB-LVH)
247.000 Fort Stewart, GA "Marne Radio" (Wright AAF Tower-LVH)
253.100 US Navy (My notes indicates the Tacts range at Pinecastle-LVH)
265.800 US Navy (Mayport Naval Station Tower-LVH)
268.800 US Navy (Whitehouse Field Tower-LVH)
275.400 US Navy (Whitehouse Field Landing Signal Officer-LVH)
277.450 Army (Camp Blanding Range Control-LVH)
280.000 Unknown (The only thing I show in the southeast US is an air-to-air assignment for an unidentified US Air Force unit out of Birmingham, AL-LVH)
285.725 US Navy (Actually it is the US Air Force, Avon Park Charlie/Echo range control-LVH)
287.000 US Air Force (Not a clue-LVH)
292.700 Oakgrove (SE Air Defense-Tyndall AFB-LVH)
297.600 US Air Force ACM (I have heard the B-1B aircraft from Robins use this as an air-to-air-LVH)
300.800 125th Fighter Intercept Squadron (Jacksonville International Airport callsign Fang-LVH)
320.300 Eglin Ground Controlled Approach (GCA)
325.400 US Navy (That was an old Cecil Field air-to-air-LVH)
335.000 Eglin Ground Controlled Approach (GCA) (I show this as an Eglin glideslope navaid frequency-LVH)
348.300 Live Oak MOA
349.900 US Navy (My notes indicate an assignment for the offshore warning areas from the Cape-LVH)
363.900 US Air Force (I show this assigned to Patrick AFB-LVH)

Maryland VHF Hi-band Air-to-Air

Ron, a regular Milcom reporter from Maryland, passed along an update from his area on 138-151 MHz military air-to-air communications (see the May 1999 *Milcom* column) he has recently monitored (mode is AM).

136.725 Special Air Mission interplane frequency (This is one to keep in every scanner-LVH)
141.550 Special Air Mission VHF Command Post (89th ALW, Andrews)
141.700 1st Helicopter Squadron (UH-1 helicopters, Andrews AFB) interplane frequency

142.750 Used by Venus Control (89th ALW) Andrews AFB, Maryland
143.800 Raven Operations (Maryland Air National Guard 175th Fighter Squadron A-10 aircraft, Martin State Airport, Maryland)
138.875 McGuire AFB, NJ tanker interplane frequency (305AMW Team callsign KC-10s)
138.975 McGuire AFB, NJ tanker interplane frequency
139.725 McGuire AFB, NJ tanker interplane frequency
139.825 McGuire AFB, NJ tanker interplane frequency
139.875 McGuire AFB, NJ tanker interplane frequency (Both the Team [KC10] and Mover [KC-135] aircraft have been reported here-LVH)
143.825 McGuire AFB, NJ tanker interplane frequency (Team aircraft air-to-air reported here-LVH)
143.875 McGuire AFB, NJ tanker interplane frequency

For Ron and our readers: additional McGuire AFB KC-10 interplane activity has been reported on 123.450 and 130.650 in the civilian aircraft band and 149.325 in the AM mode.

In addition to the list above, the District of Columbia Air National Guard F-16 aircraft based at Andrews AFB; the New Jersey Air National Guard F-16 aircraft based at Atlantic City International Airport; and Virginia Air National Guard F-16 aircraft based at Richmond International Airport also make extensive use of the 138-151 MHz range for AM air-to-air communications. From Larry Van Horn's notes:

DC ANG Andrews AFB (113 FW)

139.750 ACM/Intercept Training (Button 8)

New Jersey ANG Atlantic City International Airport (177 FW)

138.100 Air-to-Air (Button 19)
138.250 Air-to-Air (Button 14)
138.425 Air-to-Air (Button 16)
138.875 Air-to-Air

Virginia ANG Richmond International Airport (192 FW)

Reported tactical discrete frequencies: 138.425, 139.625, 141.600, 141.625, 141.750, 141.825, 141.875, 142.175, 143.825, and 148.125

Montgomery County, Texas EDACS System

Courtesy of Chris Parris in Conroe, Texas, and Trunkcom

866.3250 LCN 1
866.7750 LCN 2
867.2500 LCN 3
867.7750 LCN 4
868.2750 LCN 5
868.8375 LCN 6
866.3500 LCN 7
866.8250 LCN 8
867.1000 LCN 9
867.3250 LCN 10
867.8000 LCN 11
868.3500 LCN 12
868.6875 LCN 13
867.3000 LCN 14
867.8500 LCN 15

867.2750 is also licensed as part of the trunked system, but it has so far not shown up in the LCN rotation. Chris believes it is being used as a conventional repeater channel at the MCSO Jail — or at least it is programmed in the radios as such.

Kansas City ARTCC Frequencies

By Paul Bunyan

Anthony, KS 118.350/344.800 133.200/263.100 ?/257.000
Butler, MO 125.550/327.000
Chanute, KS 132.900/279.500
Chillicothe, MO 125.250/381.500
Columbia, MO 118.400/299.200 119.475/279.600
Decatur, IL 134.500/350.200
Edna, KS 124.300/335.600 132.100/?
Effingham, IL 118.125/257.850 128.600/343.900
Emporia, KS 133.225/346.400 135.050/290.400
Farmington, MO 120.200/323.200 121.400/269.200
Gage, OK 132.250/285.400
Hutchinson, KS 128.400/291.700 132.650/307.800
Jacksonville, IL 134.425/319.000
Kirksville, MO 126.950/379.200 ?/281.400
Liberal, KS 118.800/337.400 134.300/273.600
Manhattan, KS 135.900/269.500 -/353.900
Maples, MO 127.275/327.500
Marion, IL 132.600/370.900 134.625/269.300
Mt. Vernon, IL 134.000/290.800 134.675/387.100
Natoma, KS 127.350/388.800
Olathe, KS 133.400/323.100
Oklahoma City, OK 125.300/269.500
Ponca City, OK 127.700/317.700
Quincy, IL 124.400/322.400
Richland, MO 128.300/291.700
St. Joseph, MO 132.325/352.000
Salina, KS 127.800/319.100 ?/317.600
Sedalia, MO 133.725/290.700 135.525/319.900
Springfield, MO 125.675/273.450 133.800/317.500
Topeka, KS 121.250/269.600 125.500/380.200
Tulsa, OK 125.900/327.100 127.225/304.200
Unknown Site 128.100/351.900
Vandalia, IL 127.900/251.100
133.925/296.600 134.900/363.200
119.650/285.600
127.500/269.400 133.475/277.400
135.175/290.500
120.500/290.200 123.800/343.700
134.725/257.750
128.800/354.100 135.550/281.450
123.925/?
127.125/360.850
125.725/338.200

VHF Lo-Band Skip intercepts

From Larry Van Horn, Brasstown, NC

All times UTC, all freqs in MHz, mode is Narrowband FM

32.003 HJB 34, Radio Cadena Nacional, Brisas del San Juan, Colombia, at 1945 with Spanish music and male announcer with ID. Fairly deep fades and I can only hear the station in SSB mode due to QRN.
33.740 KDN 945, Fire Dispatch, La Habra Heights, CA, with a male dispatcher broadcasting with daily announcements at 1501.
37.940 KFE 221, Rim of the World Unified School District, Lake Arrowhead, CA, with female operators having a very casual discussion about pickups.
39.580 KNFL 215, Transit District Dispatch, San Rafael, CA, heard at 1755 male dispatcher repeater output (input 46.520).
39.920 Unidentified law enforcement agency with male dispatcher noted at 1925.
42.140 Unidentified Spanish males heard at 1500 with what sounds like some sort of a dispatch operation

Hugh Stegman, NV6H

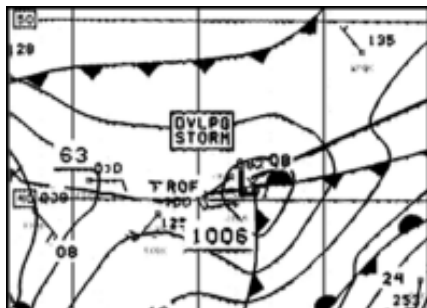
utilityworld@ominous-valve.com

www.ominous-valve.com/uteworld.html

Black Fax from the Sky

A couple of years ago, the United States Navy discontinued most of its scheduled shortwave (HF) radiofacsimile (fax) transmissions. These are still sent on request from the fleet, but such requests are rare.

The US Air Force, however, continued broadcasting its big, informative charts of the whole North American continent. These came on a daily schedule from the Global Weather Center, at Offutt Air Force Base in Nebraska, using the identifier "KGWC." Like many of these weather IDs, though, it wasn't a radio callsign. Actual transmitters were in the central US and Puerto Rico.



Starting late last year, things got a little strange. Sometimes the map would be blank, or nearly so, showing only state and international borders, and maybe a wind arrow or two. Sometimes a few symbols or labels would show, but on a black background. Increasingly, the map and labels would both be gone, resulting in a completely black fax, occasionally with a few weird little scratches that only made it look even stranger.

Black faxes cause problems. They take up just as much bandwidth and disk space as any others, but they are basically files of nothing, and rather expensive nothing if your machine prints everything. It's hard not to conclude that something was rather seriously malfunctioning somewhere down the line between KGWC and the transmitters. It's downright unsettling to think that the HF service was so little used that no one important seemed to care.

I went looking around the Internet for any answers. KGWC had World Wide Web pages galore. Unfortunately, just about everything had been restricted to military users, apparently so abruptly as to leave civilians with hundreds of links to nowhere.

About the only thing left open to the public was a long presentation about the Global Weather Center's new supercomputers and real-time atmospheric models. These let pilots "fly" missions in three dimensions before ever getting into the airplanes. It was made very clear that old-style weather charts were only around as "legacy" for allies that lacked all the bells and whistles for the good stuff.

On January 21, all KGWC's frequencies went to a constant "black" tone of 1500 hertz. At press time in early February, they whistle still. Either something is down for repair, or, just as likely, we've seen the end of HF weather fax from the US Air Force.

We'll probably know by the time you read this column. It will be worth checking KGWC's frequencies to see what, if anything, is there. Anyone wanting to help can try 4855, 7398, 7870, 11622, 15781, 19325.8, and 19363 kilohertz (kHz).

HF Fax Is Alive

Two or three years ago, it looked like time to dig a grave for radio facsimile transmissions on HF. Along with the Navy,

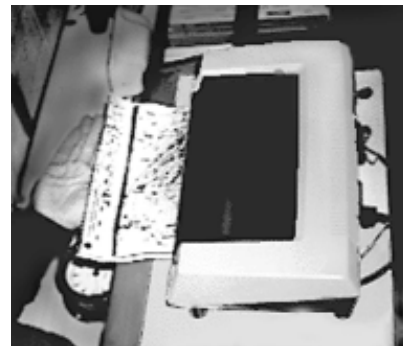
other stations were dropping off worldwide, and the US Coast Guard was having some budget problems.

As always, death notices were premature. The spread of cheap, simple shareware decoders for personal computers made HF fax a perfect distribution system. Anyone with a communication-grade receiver and a sound input on their computer can connect one cable, find a nice clean signal, and see pictures from the sky.

Since most of these are surprisingly large, reception is not as slow as it looks. Anyway, it can proceed in the background while the computer is still used for other things.

Technically, HF fax is FM (frequency modulation), though it's sent and received in upper sideband (USB). Pictures are scanned by large, expensive machines, one line at a time. Brightness is converted into analog audio tones, which ultimately come out as 1500 hertz for black and 2300 for white, usually with one sync pulse of pure black per line. Radio frequencies are listed by their assigned carrier channels, and most receivers will read 1.9 kHz lower when properly tuned.

The two significant parameters are the scan speed in lines per minute (LPM) and a weird resolution spec called the "index of cooperation" (IOC). Weather faxes are 120 LPM, with an IOC of 576. A few hams and Russian stations use an IOC of 288, otherwise this is rare. News faxes are usually sent



at half speed, 60 LPM.

Some remarkable faxes come from JJC, Japan's Kyodo News Service. These are entire newspapers, in Japanese, taking hours to send. Unfortunately, at least half are scrambled with a line-shifting system somewhat resembling the "videocrypt" used by European pay TV.

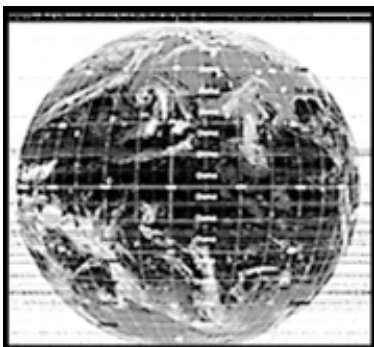
Kyodo broadcasts are continuous, but a good time to catch an English station identifier seems to be around 2200 Coordinated Universal Time. JJC frequencies are 4316, 8467.5, 12745.5, 16971, 17069.5, and 22542 kHz. Their Singapore station uses 16035 and 17430 kHz.

More Panama

Our February *Utility World* mentioned possible US communication intelligence activities, notably a covert intercept station, at a US Army facility in Corozal. Milton Withers, an engineer who supervised construction of a microwave tower there, has sent e-mail noting "for the record" that Corozal had some impressive dishes and antennas, but no interception of communication ever took place there.

According to Withers, Corozal was a technical control facility for the US military's various comm systems, with microwave, a phone switch, and several satellite earth stations. Another large dish was used by the Panama Canal Commission.

Withers says that the Galeta Island station, on the Atlantic side, and Chiva Chiva, near Fort Clayton, did indeed house sensitive intercept operations. Both, however, are closed.





Hugh Stegman

Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
AMTOR	Amateur Teleprinting Over Radio
ANG	Air National Guard
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	Single-channel ARQ teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CIA	Central Intelligence Agency
CP	Command Post
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Agency
EAM	Emergency Action Message
FAX	Radio Facsimile
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FS	French Ship
JSTARS	Joint Surveillance Target Attack Radar System
LSB	Lower Sideband
MARS	Military Affiliate Radio Service
MFA	Ministry of Foreign Affairs
Navtex	Navigational Telex; automated safety info
NASA	National Aeronautics and Space Administration
Ops	Operations
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SECURE	State Emergency Capability Using Radio Effectively
SELCAL	Selective Calling tones
SHARES	Shared Resources
SITOR	Simplex Teleprinting Over Radio
UK	United Kingdom
Unid	Unidentified
US	United States
VIP	Very Important Person
VOLMET	Aviation weather observations
Y2K	Year 2000 computer changeover

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

- 518.0 "A"-Identifier used by Corsen Navtex, France, with SITOR maritime safety bulletins at 0800. J-Stockholm Radio, Sweden, Navtex at 2128. K-Niton Radio, UK, at 2140. L-Rogaland Radio, Norway, at 2148. G-Cullercoats Radio, UK, at 2155. P-Netherlands Coast Guard, at 2155. M-Oostende Radio, Belgium, at 2200. Q?-Malin Head Radio, Spain, at 2243. S-Niton Radio, at 2300. T-Oostende Radio, at 2310. (Ary Boender-Netherlands)
- 621.0 Unid-North Korean female AM "numbers" on large Radio Pyongyang transmitters, played "Red Flag Song" first, at 1500. Also uses 657, 702, 720, 855, 3250, and 6400 kHz. (Takashi Yamaguchi-Japan)
- 2474.0 PBC-Dutch navy, Goeree, RTTY bulletins at 2039. (Boender-Netherlands)
- 2518.0 Bravo Whiskey-US Navy, with several stations using single-letter calls, all in tactical data link ("Link-11") coordination net, at 0704. (Tom Severt-KS)
- 3167.5 "J-4-B"-Possible US military, working "L-4-I" at 0627. (Paul Bunyan-MO)
- 3551.0 L9CC-Non-amateur CW station calling CP17, first 80-meter appearance in a while, at 1850. (Yamaguchi-Japan)
- 4016.0 Cuban "Cut" numbers, CW at 0338. (Severt-KS)
- 4027.0 Cuban "Cut" numbers, CW, at 0300 and 1100. Cuban "Atencion" numbers, AM, different day at 1100. (Camillo Castillo-Panama)
- 4028.0 Cuban "Atencion" numbers, AM at 0317, different day at 0519. (Severt-KS)
- 4470.0 The English Lady- Russian AM numbers station, in English, at 0400. (Severt-KS)
- 4479.0 Cuban "Cut" numbers, CW, at 0300 Cuban "Atencion" numbers, AM at 0400. (Castillo-Panama)
- 4625.0 The Buzzer-Descriptively named Russian channel marker and occasional numbers, not heard often in the US, at 0100. (John Maky-AR)
- 4770.0 Unid North Korean numbers station, started with "The Song Of Marshal Kim Il Sung," then "Cantata to Marshal Kim Il Sung," many spurious signals plus a "real" parallel on 5879, at 1000. (Yamaguchi-Japan)
- 5192.0 WGY 955-Illinois Emergency Operations Center, Springfield, working IL State Police District 7, Rock Island, using ALE on an Operation SECURE frequency, at 1603. (Bunyan-MO)
- 5236.0 AFA1NY-US Air Force MARS, PA, acting as SHARES Coordination Station, Northeast, taking SHARES Y2k check-ins from Penn CAP 12 (Civil Air Patrol), AAR1IS (US Army MARS, CT), AAT3GO (PA), AAR3XX (PA), AAR3QL (VA), AAR2GO (NY), NNN0LNF (US Navy/Marine Corps MARS, NJ), NNN0WHT, NNN0IKE (Mobile in DE), AFA1EE (US Air Force MARS, NY), AFA1LE, AFA2EA (VA), KNY 73 (National Communications System, WA), KNY 62 portable (NCS, NJ), and KGA 93 (FCC, Wash DC), at 1509. (Ron Perron-MD)
- 5277.0 CG 63A-US Coast Guard, working Shark 19 and Panther (DEA/ Customs, Bahamas) at 0402. Panther telling "055" to use 7449.2 kHz, at 0507. Panther working Coast Guard Rescue 6060, taking pump to distressed vessel, at 0516. (Perron-MD)
- 5505.0 Shannon Volmet-Shannon, Ireland, with aviation weather for European destinations, at 0409 (Sue Wilden-IN)
- 5547.0 NASA 809-NASA ER-2 high-altitude research aircraft, giving San Francisco Radio flight level 600 (approximately 60,000 feet). Poor SF controller advised that his computer wouldn't accept altitudes over 470. NASA said to enter whatever worked, at 0117. (Stonetower-NY)
- 5687.0 Plantation Ops-US Air Force, Hurlburt Field, FL, setting up with aircraft Folio 11, at 0134. (Allan Stern-FL)
- 5696.0 Coast Guard Rescue 6007-US Coast Guard H-60, above distressed fishing vessel *Rebecca Mary*, working CAMSLANT 0018. (Perron-MD)
- 5708.0 "Lockheed"-Company station calling Lockheed 5465, no joy at 0242. (Paul Bunyan-MO)
- 5841.0 Coast Guard 10C-US Coast Guard helicopter working Panther (DEA/Customs, Bahamas), Shark 19, and Stingray 35, in a pursuit at 2344. (Perron-MD)
- 6215.0 Unid AM female numbers station, played a pop song first, at 0930. (Yamaguchi-Japan)
- 6255.0 Cuban "Atencion," AM numbers at 0436. (Severt-KS)
- 6329.0 4XZ-possibly Israeli navy, CW marker at 1759. (Yamaguchi-Japan)
- 6494.0 Unid FAX station with weather chart, at 0115. (Wilden-IN) *This is Canadian Forces, Halifax, assigned 6496.4, also uses RTTY.* - Hugh
- 6676.0 Sydney Volmet, Australia, automated voice weather at 1610. (Gary Cohen-China)
- 6767.0 Cuban "Cut" numbers, CW, also different days on 6795, 6768, 6825, 6854, 6933, and 7889, always at 1300. (Castillo-Panama)
- 6840.0 NYZ-Unknown CW station, repeated calls to Q2M, at 1420. EZI-Mossad, Israel, with callup and "numbers," also on 9130, at 1700. (Yamaguchi-Japan)
- 6873.0 Unid Voice of America feeder, probably Greenville, NC, came up just before the hour and ran *Communications World*, in double-sideband AM with a greatly reduced carrier, at 0700. (Bunyan-MO) *This is apparently a weekly schedule now.* -Hugh
- 6876.0 Unid-Russian CW 5-figure "numbers," ended "000 000," started at 0530. (Severt-KS)
- 6885.0 "Guangzhou"-Unknown mainland Chinese "numbers," female Mandarin voice, stopping frequently for, "All stations, this is Guangzhou, we are waiting for your messages," parallel on 10750, at 1500. (Yamaguchi-Japan)

- 6933.0 Cuban "Cut" numbers, CW, also uses 7889, at 1200. (Castillo-Panama)
- 6959.0 Lincolnshire Poacher-British MI6/SIS, Cyprus, numbers ending at 2145. (Sevart-KS)
- 6993.0 SAM 27000-US Air Force VIP aircraft, patching via Andrews for weather at Eielson AFB, AK, at 1315. (Bunyan-MO)
- 7632.0 Blue 21-US Air Force, in patch via Offutt to Shocker Maintenance, McConnell AFB, KS, at 1612. (Bunyan-MO)
- 7885.0 Unid "numbers" voice in English, AM at 0300. (Castillo-Panama)
- 8291.0 GZW-Official vessel for Cape to Rio Yacht Race, working Cape Town Radio, RSA, and many participants, at 0900. (Bob Hall-RSA)
- 8300.0 "New Star Radio Station," probably Taiwan, female Chinese numbers at 1409. (Sevart-KS)
- 8336.0 "Carlo 5"-Probably Mexican army, with Radiogramma from Juarez "Capitan," rogered in CW by "0-Whiskey," at 2322. (Perron-MD)
- 8743.0 Bangkok- Bangkok Meteorological Radio, with regional weather in alternating English and Thai, also using 6765.1, at 1610. (Gary Cohen-China). *International maritime duplex channel. Odd. -Hugh*
- 8820.0 Manila Aeradio-Philippine regional air route station, working aircraft at 0915. (Yamaguchi-Japan)
- 8828.0 Hong Kong Volmet, with automated voice weather at 1630 UTC. (Cohen-China)
- 8942.0 Manila Radio, SELCAL with Vietnam Air 940, then position from Singapore 998, at 1745 and 7153. (Cohen-China)
- 8971.0 Lookout 06-US military working Blue Star (US Navy, PR) and Dagger 10, (probably US military), in a pursuit at 0132. (Perron-MD)
- 8992.0 Unknown US Air Force, with tones and messages at 1720 and 1726. (Cohen-China) Mayberry-US military, asking Hickam Global to have MacDill Global come up for secure data circuit setup, finally given the bad news that this station closed years ago, at 0238. (Haverlah-TX and Stern-FL) Belly Flop-US military, setting up a secure data link with Watch Band, at 1829. (Haverlah-TX) IAF001-Italian Air Force calling Thule, then any station, no joy at 2300. (Sevart-KS)
- 9725.0 "New Star Radio Station," probably Taiwan but not the same "service" as 8300, with AM Chinese numbers at 1409. (Sevart-KS)
- 10204.0 Cattleman-US military, with EAM simulcast on 9016, then in a net with Hard Luck and Snowfall, starting at 2139. (Haverlah-TX)
- 10536.0 CFH-Canadian Forces, Halifax, NS, with FAX surface weather chart at 0415. (Hall-RSA) *Like 6496.4, switching periodically to RTTY. -Hugh*
- 10780.0 JSTARS 03-US Air Force tactical surveillance aircraft, working Cape Radio, FL, at 0116. (Haverlah-TX)
- 11158.0 "ANG Camp Peary"-US Air National Guard, VA, working "ANG Springfield," OH, also using 9121 kHz, and an unknown 4 MHz frequency, at 1532. (Bunyan-MO)
- 11175.0 Crown 60-US Air Force C-130, in patch via Hickam Global for weather at Eielson AFB, at 0436. Razor 22-US Air Force JSTARS surveillance aircraft, in radio check with Hickam at 0451. (Perron-MD) SAM 204-US Air Force VIP flight, in a patch via Hickam Global with arrival time in Guam, at 0543. (Haverlah-TX)
- 11178.0 Falcon 01-Dutch Navy patrol aircraft, working PJC (Dutch Navy, Hato, Curacao) at 2223. Hotel 01-Dutch Navy, calling Orion 03, probably a P-3, no joy at 2234. (Perron-MD)
- 11232.0 Canadian Rescue 342-Canadian Forces HC-130, Winnipeg, working Trenton Military at 1937. Canforce 4209, working Trenton at 4209. (Perron-MD)
- 11244.0 Belly Flop-US military, calling Watch Band and quickly gone, possibly wrong frequency, at 1802. (Haverlah-TX)
- 12788.0 NMN-US Coast Guard CAMSLANT, Chesapeake, VA, voice synthesized high seas Atlantic weather at 2348. (Wilden-IN)
- 12877.5 UIW-Kaliningrad Radio, Russia, testing RTTY at 1518. (Boender-Netherlands)
- 13203.0 German Air Force 338-Aircraft leaving Kansas City for Holloman AFB, NM, working unknown station at 1650. (Bunyan-MO)
- 13204.0 Razor 33-US Air Force JSTARS surveillance aircraft, calling Trenton Military, Canada, no joy at 1925. (Stern-FL)
- 13241.0 Navy 49676-US Navy, with patch via Andrews VIP to Rota CP, Spain, at 2222. (Bunyan-MO)
- 13270.0 New York Radio, with Volmet aviation weather at 1441. (Wilden-IN)
- 13533.0 ART2-Abnormal Mossad callup, Israel, usually EZI, at 1900. EZI-Mossad, Israel, numbers at 1430. (Yamaguchi-Japan)
- 14396.5 AFA3HY-US Air Force MARS, KS, acting as SHARES Y2K check-ins from AAR9CI (US Army MARS, NV), AAR9FG (CA), AAR1 DV (NH), AFA4MK (US Air Force MARS, TX), NNN0AHK (US Navy/Marine Corps MARS, MT), NNN0AJK (ID), WPKJ 542 (National Telecommunications Alliance, CA), and KGD 34 (National Communications System), all at 1737. (Perron-MD)
- 14567.0 WGY 908-FEMA, CO, working WGY 925, FEMA, WI, talking on the upper sideband while testing a Y2K data link on the lower, at 1533. (Bunyan-MO)
- 14931.0 8BY-French Intelligence, Paris, usual CW numbers, also on 7668 and 10248, at 1840. (Yamaguchi-Japan)
- 15793.0 Aria 2-US Air Force Advanced Range Instrumentation Aircraft, working Abnormal 10 (Western Test Range, Vandenberg AFB, CA) at 1831. (Bunyan-MO)
- 15962.0 Pinocchio-US military, working Dignitary, possibly WAR 46, US Joint Alternate CP, MD and PA, at 2054. WAR 46 may be using rotating identifiers now. (Haverlah-TX)
- 16086.0 The Counting Station-US CIA, numbers, in AM [*actually reduced carrier USB -Hugh*], also on 19533, at 1100. (Yamaguchi-Japan)
- 16117.0 Navy 50496- US Navy, working Andrews VIP and Navy 49676 on "F-020," at 0242. (Bunyan-MO)
- 16804.0 Sovship MA 1819-Russian fishing trawler off Africa, RTTY catch and weather reports for Murmansk base, at 0808. (Hall-RSA)
- 18006.0 Judicate-US military, went to secure data mode with Andrews Global on this discrete frequency, at 2103. (Bunyan-MO)
- 18183.4 Ambalg Maputo-Algerian MFA, with RTTY news at 1200. (Hall-RSA)
- 18275.0 Unid Voice of America feeder, probably Greenville, NC, came up and ran the long *Communications World*, in double-sideband AM with a greatly reduced carrier, at 1400. (Bunyan-MO) *This is apparently another weekly schedule. -Hugh*
- 20633.7 RFVIGD-Probably French navy, with ARQ-E3 messages from "Jonquil" to "Geranium," copies for "Jasmin," "Violette," and others, at 1048. (Hall-RSA)
- 20743.0 BR6-Unknown station with markers in loud but chirpy CW, at 0600. (Yamaguchi-Japan)
- 20828.3 Unid RTTY station using a format similar to the "Atencion" numbers, possibly Cuban, at 1544. (Hall-RSA)
- 22818.5 EAE220-Madrid, Spain, with encrypted ARQ message to Embajada (Embassy) Harare, at 0921. (Hall-RSA)
- 23337.0 Reach 8053-US Air Force Air Mobility Command, direct dialing a call to McChord AFB, at 0415. Reach 5004 working Andrews at 1709. (Bunyan-MO)
- 23461.0 Cherry Ripe-British MI6/SIS, Guam, with tune and numbers at 1000. Parallel 20474 started 12 minutes late; asleep at the switch? (Yamaguchi-Japan)
- 24282.0 WGY 912-FEMA Special Facility, VA, working WGY 9181, probably a mobile station, at 1519. (Bunyan-MO)
- 26241.6 RFVI- French Forces, Le Port, with ARQ-E3 news and sports at 0824. RFVI with ARQ-E3 relay from FS *Albatross*, at 0950. (Hall-RSA)
- 26441.7 RUEOMCB- NATO routing code used by US Navy, with ARQ-E3 code groups at 0910. RFFLAGE-French Navy minesweeper FS *L'Aigle*, working RFVIFLR (FS *Floreal*), and RFVIGRN (FS *Garonne*), ARQ-E3 at 1335. (Hall-RSA)
- 27870.0 Croughton-US Air Force, UK, testing ALE at 1733. Sierra 11, testing ALE at 1839. JNR-Puerto Rico, testing ALE with Andrews at 1921. (Bunyan-MO)
- 27987.2 AFA1MH-US Air Force MARS, OH, in AMTOR (an amateur teleprinting mode) at 1709. (Bunyan-MO)

More on VFT and French Forces

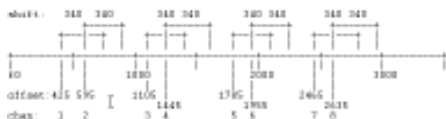
In March we discussed voice frequency telegraphy (VFT) techniques and provided a few examples. Here are a few more examples of users of this mode and the equipment you need for their reception.

UK Military 8 Channel (DCN) VFT

The UK Defence Communications Network (DCN) interleaved VFT can still be heard on some frequencies – interleaved as channels “overlap” or straddle each other (see Figure 1 below). Channels may all run 50 baud or 75 bd Baudot with 340 Hz shift, or may be a mixture of those and ARQ-M2 running at 96 bd with 340 Hz shift. Channel centers are at +595, 765, 1275, 1445, 1955, 2125, 2635 and 2805 Hz.

Most channels carry RYIRYIRYI-style “test tape” traffic, but channel 1 carries occasional exchanges between the operators at each end of the link. This type of VFT is also known as British HL13.

Figure 1: UK DCN VFT



UK Military Piccolo-6 VFT

Perhaps the most common VFT on the air today are those run by the regular and reserve units of the UK Royal Navy, Army and Air Force. Piccolo-6 units exist in 2, 3 and 4 channel VFTs. Channel centers are spaced 400 Hz (regardless of the number of channels in operation in the VFT) as follows:

(Common) +510, 910, 1310, 1710 Hz

(Rarely) +1010, 1410, 1810, 2210 Hz

As with the DCN VFT, channel 1 is usually the engineer’s channel and stays idle for long periods. Patience and some luck will bring the callsign and other chatter. See “Digital Digest,” Sep 1999, for a deeper look at Piccolo and a frequency list.

Other VFTs

A number of once common VFT systems are now very seldom, if ever heard: these include a 2 to 5 channel ARQ-E VFT system used between various German Police units; a VFT comprising three channels of an unknown 144bd/200Hz shift FEC system be-

lieved to provide telex links between Russian cities; the US Navy “Mulcast” VFT with 16 channels of 85 Hz each.

Decoding VFT Systems

Narrow filters and fine receiver tuning steps (50 Hz or less) are essential for trouble-free VFT listening. The reason is obvious: the filter allows a single channel to be isolated from adjacent channels, and accurate tuning places the chosen tones where they should be for optimum decoding. Let’s start with the easiest first.

If you’re lucky enough to have a Wavecom 41-series or Hoka Code30 decoder, these already have settings that allow most of the common VFTs (BR6028 for example) to be decoded channel-by-channel, once correctly tuned.

Most of us these days are fortunate enough to have the next best thing – a good receiver with the necessary fine tuning steps and a selection of narrow filters (500 Hz is good; 250 Hz is better).

Start with a wide filter setting on the receiver and roughly tune the VFT signal. Then tune away from the signal until it’s just about out of the receiver’s passband. Assuming a VFT with channels having a shift of 170 Hz, using the decoder’s spectrum display, set the decoder’s filter width to 170 Hz or 200 Hz (e.g., “S” followed by “4” or “5” in the Hoka Code 3, 3-Gold or 30 Audio Spectrum screen). Now very slowly tune the VFT signal back into the receiver’s passband. You should then be able to see each channel’s tone pair and be able to accurately measure its shift and speed, and thereby the system.

More on the French Forces

Our February “Something for Everyone” column overflowed the available space somewhat, so we wanted to add a little more meat to this subject. Particularly, how to correctly identify these familiar and globally audible stations.

The French Forces make use of the single channel ARQ-E and ARQ-E3 systems, in addition to dual- or four-channel (rarely) ARQ-M2 (aka TDM-242) and ARQ-M4 (aka TDM-342). Most of the popular decoders have dedicated modules for their reception, so we’ll not concern ourselves with the signal composition.

However, watch out for rare occurrences of single-tone versions of these systems, fre-

quently caught and logged by monitors as a real “exotic.” These signals use OOK (On-Off Keying) of a single tone, rather than the usual frequency shift keying (FSK) with two tones!

Almost without exception, these stations use 400 Hz shift with speeds of 48, 96, 100, 184.6, 192 or 200 bd. Stations idle for long periods, and it’s often best to park the receiver on a suspected channel, find the right system settings and activate the “save to ASCII file” function for unattended monitoring.

The key to correctly identifying the French Military is to note that the stations use a circuit identifier. These are sent with all regular NATO-style message traffic, and the periodic “controle de voie” (link check) status messages. The “de” or “from” line of the message identifies the originating station, but it is the circuit identifier that tells you the relaying link being used, and therefore the actual station being heard. Here’s a real example of a link-check message:

```
vzcrcrun828
oo rfqp
de rfqp 2141152
znr uuuuu
controle de voie
nnnn
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Interpreting: “vzcrc” is the usual message lead-in, and “run828” is the circuit identifier and message number. Looking-up “RUN” in Ary Boender’s excellent *Guide to NATO Routing Identifiers* (Special Topic Report 97-6) on the WUN website (www.wunclub.com) reveals that this is the French Forces in Le Port.

Here are some recently logged French Forces frequencies for your enjoyment (note the preference for a 200 or 700 Hz offset)!

8108.2	16261.7
10132.5	16310.2
10493.7	16345.3
10917.7	16351.7
11421.7	18214.0
11518.2	18503.7
13472.5	18966.7
13572.5	19063.7
13940.7	19204.7
14446.3	19216.7
14585.7	19418.7
14626.7	20179.7
14926.7	20633.7
14959.7	20813.7
16014.2	20847.7

This Month's Headlines

This month we report on comebacks by Africans, including ELWA Liberia, Malawi, Sierra Leone, and future plans for stations in Central African Republic and Equatorial Guinea. Latin America also expects new stations in Uruguay and Venezuela, and Nicaragua's only SW needs help to return. South Korea has to replace antennas. BBC's new leader promises reforms, putting programming first, while Merlin Network One fades out further.

Iran's mullahs stepped up jamming western broadcasts in a vain attempt to hold onto power in the mid-February elections. Japan finally starts streaming on the Web, and we have more and more websites to check, even Madagascar.

Remember that many seasonal frequency and time changes as of March 26 could not be predicted at presstime for this column.

AFGHANISTAN 7002, Kabul National Radio [ex Voice of Shar'iah?] heard at 1405 with religious song, talk probably in Dari, 1430 News; 1502 in English with a song "Taliban Taliban..." after that ID as "This is Kabul National Radio, English program," news in good English, then religious program. 1523 program in Urdu for 20 minutes and followed with other languages until off at 1632; fair reception but distorted audio Feb 17 (Mahendra Vaghjee, Mauritius, *DX Listening Digest*)

A few days later R. Kabul seemed to have moved to 7073 at 1435-1750+, but no English or Urdu, talking about Islamic conference and Kashmir. After that, English at 1500 had strange ID as "V. of Shar'iah, Human Service for the Common Market Town!" (Mahendra Vaghjee, Mauritius) Maybe it's obvious for most of us, but the recent move of Kabul based Voice of Sharia to v7002 kHz might be connected to the activities of opposition voice Radio Takhar on v7000. So, take care when trying to identify which of the Afghan voices you actually hear :-). As it seems, Kabul authorities take Radio Takhar quite seriously (Harald Kuhl, Germany, *hard-core-dx*)

AUSTRALIA Draft legislation setting up licensing for international broadcasters to transmit from Australia (designed primarily for Darwin site) has been referred to a Senate committee for further scrutiny. The Broadcasting Services Amendment Bill (No. 4) 1999 will be studied by the Senate's Foreign Affairs, Defence and Trade Legislation Committee which will present its final report by 4 April 2000. The committee's inquiry will focus on the powers conferred on the Minister for Foreign Affairs under the Bill. (Basically, the Bill gives the Minister [authority] to approve or decline international broadcasting licenses on national interest grounds.) (Matt Francis, Australia, via Tim Gaynor, *swl@qth.net*)

BOLIVIA Radio Juan XXIII, San Ignacio de Velasco is now on 6055 [ex-4965 as planned], heard Jan 20 at 2300, but somewhat difficult with heterodynes. I don't know how well this will work in the target area (Rogildo Fontenelle Aragão, Cochabamba, DX Clube do Brasil)

BRAZIL Our colleague Samuel Cassio Martins has heard in São Carlos around 2255 a new station on 5025, IDing as FM Vale do Xingu, Altamira PA, (ex Radio Jornal?), probably a relay of a local FM (Márcio R. F. Bertoldi, DX Clube Paulista, *radio-escutas*)

CANADA The Town of Sackville, New Brunswick, had its own website. If you want to realize that there's more to the place than just the RCI transmitter site, check <http://www.sackville.com> (Bill Westenhaver, *DX Listening Digest*)

CENTRAL AFRICAN REPUBLIC Radio MINURCA went off the air Feb 1 at 0615. UN radio should be back on the air from its new home in the CAR in about a month. Our project for an after-MINURCA radio is going well. A new radio building is under construction at the UNDP compound thanks to a grant from the German government. The Japanese government is likely to buy new equipment for the operation. If all goes well, could be on air in three weeks. It will use the same frequencies as Radio MINURCA [5900, 9900], with an as-of-yet to be determined name (David Smith, R. MINURCA station manager via Hans Johnson, *Cumbre DX*) I finally managed to hear this last Nov on 5900, despite Bulgaria co-channel in the 0100-0600 period; QSLed as 125 watts (Don Nelson, OR, *DX Listening Digest*)

CHINA [non] The CRI relays via Cuba listed in our February column had disappeared by Jan. 23 (Bob Thomas, *World Of Radio*) Shortly after they were officially acknowledged by the Cuban government. Perhaps Cuba had a more urgent use for the transmitters, such as stepping up jamming (gh)

COSTA RICA Radio Casino, 5954.1 is irregular, maybe on one day every three weeks. Their signal is fair when they are on. Best reception just after *1200 (Hans Johnson, FL, Jan-Feb, *Cumbre DX*)

CUBA Heard Arnie Coro saying RHC would be

moving its website due to problems with the previous server. If you have ever wondered how RHC manages to operate on the internet, read this enlightening report from its American accomplices: (gh) www.blythe.org/mytransfer-sub/rhupdate.html (via Mike Cooper, *DX Listening Digest*)

CZECH REPUBLIC R. Prague has edited a new series of seven QSLs for this year dealing with different aspects of Czech broadcasting (Eduard Boada i Aragonés, Spain, *Noticias DX*)

DOMINICAN REPUBLIC 5089, Radio Barahona has reactivated and is now here. Nominal, which I last heard about a year ago, is 4930. Heard during the 1000 and 1100 hours with a news program. Very distorted, just a blob in SSB and only partially readable in AM. Nearby WGTG on 5085 makes checking in the evenings a bit harder, but I don't think that they are on then (Hans Johnson, FL, Feb 16-17, *Cumbre DX*)

EQUATORIAL GUINEA A technical delegation from PR China visited this country to advise the government on improving transmissions of R. Nacional de Guinea Ecuatorial (4926 and 5005v 50 kW from Bata, and 6250v 10 kW from Malabo), as well as on their studios and links between the capital Bata and Malabo, the second most important city. Also a new transmitting centre of 400 [sic] square meters will be built to improve quality of low and high frequency transmissions. Source: newscast on R. Bata, Estación Continental, 5003.5, at 0600 UT Feb 7 (Santiago San Gil, Venezuela, *Banda Tropical*, Club Diexistas de la Amistad)

GREECE [non] VOG made schedule changes without notice. The VOA relay at 1800-2200 (still Delano 17705 leading Greenville 17565 contrary to logic), in mid-Feb no longer had English at 1800, Spanish at 1815, but all Greek at least until 2000 including relay of BBC news in Greek at 1830, a language BBC omits from *BBC On Air* listings! (gh)

GUAM Adventist World Radio has phased out issuing QSL cards at KSDA. However, QSLs still available from the AWR address in England: Adventist World Radio, 39 Brendon St, London W1, England (Adrian Peterson, AWR, *DX Listening Digest*)

GUATEMALA A survey from TX and FL by Bill Smith and Hans Johnson found: 2360 R. Maya highly irregular, seems a backup for 3324.8; 3360 LV de Nahualá active only in evenings; 3370 R. Tezulutlán usually off, backup for 4835 (*Cumbre DX*) I was traveling through the mountainous parts of Guatemala in January and noted the following formerly listed SW frequencies were inactive: 2360, 2390, 4845, 5955, 5980, 6180.

On a sad note, La Voz de Atitlán is no longer broadcasting on 1490 and 2390. Almost 3 years ago they were forced to abandon AM and SW due to the costs of operation in relation to the benefits. Only FM is now used. This station also was caught in the middle of the painful civil war in Guatemala; in the early '80s the Guatemalan army forced it off the air and its director was killed by assumed paramilitary forces. The station survived all of this only to eventually lose its battle to broadcast due to finances. The antennas are taken apart but they and the transmitters are in storage should funding ever be available; the station is run by a community organization and depends entirely on funding from external organizations. Should anyone be aware of funding sources, LV de Atitlán would certainly appreciate being put in touch (Chuck Hutton, National Radio Club *International DX Digest*)

INDONESIA 5046.37, RRI Yogyakarta, now reactivated. 1259 ID then news from Jakarta relay (Nobuo Takeno, Japan, *Jembatan DX*) Feb 10 was local all night program, still heard past 1800. February 13 was inactive; irregular. (Juichi Yamada, Japan, *Jembatan DX*)

RRI Fakfak, which broadcasts from Papua—formerly known as Irian Jaya—was knocked off the air after being looted and ransacked on Friday, January 29, according to newswire detik.com. Although the causes of the riot is unknown, wit-

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-00=midyear season, March 26-October 29, 2000; [non] = Broadcast to or for the listed country, but not necessarily originating there.*

nesses state that local residents have been upset that the state-run broadcaster continued to call the province "Iran Jaya" and not "Papua" as had been declared by President Wahid earlier this year. RRI Fakfak now refuse to return to work until their security can be guaranteed (Nick Grace, *Cumbre DX*) Well, they were on again by Feb 1, on 4789.17 at 0912-0931 with call to prayer, no ID heard but signal was fair to good so someone did a quick repair job (David Norrie, NZ, *DX Listening Digest*)

IRAN Since at least February 1st most of the VOA and RL outlets in Persian language were subject to Iranian government jamming. Some channels jammed by well known bubble jamming, others covered by strong co-channel outlets of VOIRIB Arabic. The day after the Feb 18 parliamentary elections, in general no Iranian bubble jamming was heard in Europe against VOA and R. Liberty anymore, but R. Liberty in Farsi at 0430-0730 continued to be jammed by Iran's Arabic service on 7285 and 9585; 12015 and 15290 by a different program from Iran, V. of the Islamic Revolution in Iraq, and V. of Palestine. The only Iranian bubble jamming remaining was against BSKSA Arabic 11930 at 1930 (Wolfgang Bueschel, Stuttgart, Germany)

IRELAND Radio Fax, 12255, weak with religion at 1830 //6295, 3910 (Hans-Joachim Koch, Germany, *DX Listening Digest*)

ISRAËL In Feb, Interior Minister Natan Sharansky announced that DST this year would last a record 191 days, from April 14, a week before Pessah, until October 22 (Haim Shapiro and Nina Gilbert, Jerusalem *Post* via Bill Westenhaver) Ergo the dates Israel Radio shifts all external broadcasts one UT hour earlier (gh)



A live Internet stream of many foreign language broadcasts should now be available, including English at 1035, 1900; the 1400 will continue as a recorded broadcast on demand. See www.israelradio.org/english.html (Daniel Rosenzweig, *DX Listening Digest*)

Station on 15785 in Hebrew 1100-1400+ seems to be Galei Zahal, fair but much weaker than non //15615 Reshet Beth (Noël Green, UKoGBaNI via Wolfgang Büssel, *DX Listening Digest*)

ITALY RAI, English at 2200 Feb 19 to Australia, had no news but mention of a journalists' strike (Chris Hambly, Victoria) Same for next English at 0050 on 11800, and heard opening giving metres first as 49.92, 31.01 and 25.42, then frequencies as equivalents: 6010, 9675, 11800, even tho it is the meters which are approximate equivalents of exact kHz frequencies! Hey, it's almost Century XXII! Instead of news spent a minute summarizing National Press Federation grievances and into music. Checking the parallels, 9675 had lower-fi audio than 11800, and as best I could tell amid QRM, 6010 was higher-fi (Glenn Hauser, OK, *DX Listening Digest*)

JAPAN NHK World Radio Japan began Feb 4 distributing an Internet audio stream of its radio programs in 22 languages. This is one continuous RealAudio stream with different languages at different times. English is at 00, 01, 05, 15, 17, and 21 UT. www.nhk.or.jp/rj (Kim Elliott, VOA *Communications World* via John Norfolk) The last major ISWBC station to do so? (gh)

KASHMIR [non] Voice of Free Jammu & Kashmir is regularly heard in Europe opening at 0230 on 5988.6, but beware of Radio Liberty in Uzbek splashing over from 5985. You can hear a recording of this on the Interval Signals Archive, at <http://home.clara.net/dkernick> (David Kernick, Jan 26, *hard-core-dx*)

KOREA SOUTH A major Y2k project is replacing two antennas more than 20 years old with new ones at Kimjae. One of the old ones will have to be torn down before the new one can be built since there is no extra space available. This is the antenna for service to Indonesia and the Pacific, which is bound to suffer for several months. Trying to find alternatives, RKI tested two days in Feb with a nondirectional antenna instead on 9570 at 0700-0900 in Korean and English (Han Hee Joo and Esther Li, RKI *Multiwave Feedback*)

Clandestines from South to North Korea: Echo of Hope, 0300-0700 6348, 1100-1600 3985, 6003; 1600-2300 3985. V. of the People, 0300-0600 6518, 6600; 0900-2100 3880v, 3912 (BBC Monitoring)

KURDISTAN V. of the People of Kurdistan, 0410-0420+, presumed; tune-in to talk in unID language, local music. From 4062.43 at 0410 drifted down to 4062.28 by 0420; fair (Brian Alexander, PA, *DX Listening Digest*) Clandestines: 4060.47, V. of People of Kurdistan in Kurdish, 1625-1630; 4084.99, V. of Iraqi Kurdistan in Arabic, 1631-1640, man mentioning Kurdistan, with local music (Giovanni Serra, Roma, Italy, *The Four Winds*)

LIBERIA I heard Radio Liberia International from 2115 tune-in to close with anthem at 0000 on 5000.0 kHz (Not sure if this is a new frequency replacing the previously used 5100 kHz?) Signal weak at 2115 and obviously difficult to copy with the time signal stations and other utes on 5000 kHz, but slightly stronger later. Talkative DJ in English with rap, soul, speed soukous etc music, ID as "Radio Liberia International," news at 2300. Interesting to see if they continue on this frequency (Alan Pennington, UKoGBaNI, BDXC E-Mail News)

ELWA is returning to shortwave 4760, a simulcast of their FM service initially, but plan to add other languages. Exact schedule unknown, power 1 kW, with a new transmitter designed by HCJB. Antenna a four-pole array. All this per SIM (Hans Johnson (c) *Cumbre DX*)

ELWA on 4760 has fair signal near Dallas at *0600. Sunrise at ELWA was 0712 (Bill Smith, W5USM, *hard-core-dx*) Tune in 0710 to 0800 fade out, 4760, ELWA with American religious programming, in English. ID at 0715, 0745, inaudible by 0757 (Ron Gulyas, MI, MARE) Also 2130-2205* (Enzio Gehrig, Spain, *hard-core-dx*) PO is not back to full capacity; reports may be sent via

Radio ELWA, % SIM Liberia, 08 BP 886, Abidjan 08, Côte d'Ivoire, West Africa. The SIM mission in Abidjan sends the mail to ELWA in a bulk package once a week by air (Ron Sonius, ELWA, via Enzio Gehrig, *hard-core-dx*)

MADAGASCAR Radio Madagascar has a web site at <http://takelaka.dts.mg/radmad/> and also an E-mail address: radmad@dts.mg (Pentti Lintuajarvi, Helsinki, Finland, webmaster of 1000 Lakes DX Page at www.geocities.com/Colosseum/Park/3232/dx.htm via *hard-core-dx*) Partly in French, partly in Malagasy; did not find any program or frequency schedules beyond references to meter bands (gh)

MALAWI MBC has been reactivated; good and clear on 3380 at 2100 with English songs, 2200 ID as MBC Radio One, news and then went off (Mahendra Vaghjee, Mauritius, *DX Listening Digest*)

MÉXICO R. Educación, 6185 has a mailbag program called *Entre Medios* and also an *Espacio Dixista* segment heard on a Sat at 0840. Phone the program at 5-575177. They confirm with QSL and pennant (Jorge García Rangel, *Banda Tropical*, Club Dixistas de la Amistad, Venezuela)

R. Huayacocotla, 2390, was well heard UT Sat from Seawall in Galveston, TX, as there was nothing between us but the Gulf of Mexico; From tune-in 0043 a local oom-pah brass band, "banda de viento" was playing from the community of El Sótano. 0050 a nice R. Huayacocotla jingle. Good on peaks with occasional deep fades and distortion presumably from dual path phase cancellation as rarely experienced on MW when there is no co-channel. Program was *La Carola(?) y el Trombón* dedicated to wind bands. Sign-off announcement with XEJN calls, but faded down when giving hour of return. (However, I could detect a weak signal next day at 1432.) Concluded at 0103 with a solo child haltingly singing the Mexican national anthem with native (Nahuatl?) lyrics until 0105* (Glenn Hauser, TX, *DX Listening Digest*)



[non] Zapatista program in Spanish relayed by pirate at 0043-0113* on 6950-USB, repeated at *0115-0145* on 6955-USB. Then heard from Commandante Null that it is La Voz del Zapatista (Charles Crawford, KY, *DX Listening Digest*) Null is better known as Mike Adams of NPC Information Associates in Atlanta. This was a replay of a program that ran briefly on RFPI in the spring of 1999, *Chiapas, the World Speaks*. Adams said that he posted a real audio file of this program at his website www.mindspring.com/~exomike/ A US pirate then recorded and put it on SW (Hans Johnson, *Cumbre DX*) Now known as Michael Leo Lively, Adams has a twisted sense of humor immediately evident on the webpage. Makes one wonder how seriously the Chiapas show should be taken (gh) Heard by many others the following week (*Free Radio Weekly*)

NEW ZEALAND RNZI in Jan expanded 17690 with new 1005-1205 transmission for NZ peacekeepers in Timor, Bougainville (Finbarr O'Driscoll, *DX Listening Digest*)

NICARAGUA According to a personal letter dated Nov. 26, 1999, from Sr. E. Mercado P., Director Radio Miskut, the station has been off the air [5770] since July 1999. The reason is the failure of power supply unit of the transmitter. Two parts, "Fets Q1, IRF 451, 3n5c, 9315G" (which seem to be transistors as seen from attached photocopy of xmr manual) have been damaged; therefore, they are looking for the parts, but without success in Nicaragua or in Central America. They appreciate the parts or entire power supply module of MSR 6214. (I found out that there are few electronic parts shops in Tokyo which deal with US transistors. Can anyone help to reactivate the station?) They are now operating on FM with 20 watts, hoping to increase power to 100 or 200 watts to cover suburbs of Puerto Cabezas (Tetsuya Hirahara, Japan, *Radio Nuevo Mundo*)

NIGERIA Radio Nigeria, 3326, at 1740 live commentary in English of football match between Nigeria and Morocco in the African Tournament CAN (Coupe d'Afrique des Nations). ID as the External service of Radio Nigeria (Mahendra Vaghjee, Mauritius, *DX Listening Digest*) I thought 3326 was domestic service (gh)

PERÚ 5046.2, R. Integración, Abancay, at 1100-1144 fair with music in Quechua, ID, timecheck. Programming is in Quechua and Spanish (Pedro F. Arrunátegui, Lima, *Chasqui DX*)

5130.92, Radio Uno, Tongod finally heard in Tokyo. First noted at *1157-1205, s/on with Peruvian National Anthem and a long canned ID with deep echo, then morning folklore show *Despertar Andino* (Takayuki Inoue Nozaki, *Relámpago DX*)

5865.4, R. Nuevo Cajamarca, Nueva Cajamarca, 0020-0140 huayño folk music, ID. Back in Dec had been on 5860.0. Now varies slightly with distortion, hum (Pedro F. Arrunátegui, Lima, *Chasqui DX*)

R. Real, Huarmaca, Huancabamba, Piura, 7141.6, 0030-0100 good with northern music, IDs (Pedro F. Arrunátegui, Lima) 7141.7, Radio Real, 1115-1130, Andean vocals, announcer with time checks and IDs in passing over music. Very strong signal just beginning to fade with local sunrise Feb 9. Carrier drifting and jumping around between .70 and .74. (Mark Mohrmann, VT, *DX Listening Digest*) Checking for R. Real, Feb 18 at 1130, could hear a bit of music

measured around 7141.76 (gh, OK) 7141.8, R. Real de Huarmaca, 2210-2315 with chicha music until 2240, mentioned nominal 7155 (Rafael Rodríguez, Bogotá, Colombia)

SIERRA LEONE SLBS Goderich, 3316 presumed reactivated Jan. 26, 1802-1822 in vernacular, radioplay, children singing. Not heard or reported for quite some time (Mark Veldhuis, Netherlands, *hard-core-dx*) SLBS says they were testing and commissioned 3316 Jan 28. After 15 months, they had finally received spares for 10 kW transmitter, 0600-1000 and 1900-0000 on 3316. Relying on a generator for power, hence the limited schedule. If they can get power from the grid, will expand to 1000-1900 on 5980. Per Henry Goodaig Hjax [sic], Assistant Engineer (Hans Johnson, (c) *Cumbre DX*) Actually heard until 2230* (Johnson, *ibid.*)

UKoGBANI After a transition period of several months, Greg Dyke took over from John Birt as head of the entire BBC in Jan, pledging to cut out layers of bureaucracy and spend the maximum on making high-quality programmes (BBC Online via Ricky Leong)

Don't you believe *BBC On Air's* foreign-languages page claiming it is a complete listing of more than 40 languages; we count only 35, and as we pointed out months ago, BBC omits languages not using SW. The only Europeans shown are: Albanian, Bulgarian, Croatian, Hungarian, Romanian, Serbian. Surely there are still others such as Greek. But thanks to VOG and VOA, BBC Greek is on SW now whether BBC likes it or not [see GREECE] (gh) BBC still has Czech on FM, and might resume German via a local station in Leipzig (Kai Ludwig, Germany)



The scheduling geniuses at BBC WS deprived North Americans in Jan of yet another of BBC's bright shining lights: *From Our Own Correspondent*. The weekend edition got only two airings on the AE stream, Sunday 0835 when there is no SW to us, and Sunday 1630 when American frequencies have *Concert Hall* instead, forcing us to strain to hear it on other streams! Let us hope the April changes will have brought *FOOCback*. One may read the dispatches, however, accompanied by photos and links, but apparently no audio at http://news.bbc.co.uk/1/hi/english/world/from_our_own_correspondent/default.stm Also, *Write On* lost its only prime-time airing UT Sun 0045, replaced with *Tue 1445* (gh)

On *Write On* Penny Turek, Head of the English Network for the World Service seemed to be saying that BBCWS is dropping *The Farming World* because it wants to incorporate farming stories into *One Planet*. Management wants to broaden the listenership of the programme, and thinks that this can best be done by putting it under the "umbrella" of a more general interest programme. My interpretation of that? BBCWS wants to broaden and increase its listenership, and thus is reducing and eliminate some speciality/ niche programmes. The thinking is that a series of general interest, broadly based programmes will attract listeners more than a series of discrete, specialised programmes. CBC has taken the same approach to radio programmes here in Canada (Peter Bowen, Toronto, *swprograms*)

BBC revived the defunct magazine *The Listener* Jan. 27 but only on the web experimentally; www.thelistener.com (*The Times* via Mike Cooper)

Stafford Broadcasting Society, providers of the soft-rock *Imagination* program Fridays at 1900 on 6010 via Merlin Network One, were notified in Jan that the contract would likely be canceled. The two members of staff at the MNO studio site were given notice of redundancy on Jan 13. If MNO does come to an end and the Astra feed is no longer available, *Imagination* is likely to broadcast as a radio station in its own right and with its own identity, utilising the existing 250 kW shortwave transmitter and 10 MW(!) beam in current use, providing excellent reception across most of the world (Robert Leighton, SBS via Dave Kenny, BDXC E-Mail News) MNO closed down satellite transponders in Feb after a sesquiquar on the air; programming will continue on SW and not under any single banner (SCDX/MediaScan)

Info on Earth One, from interview with its head on RN *Media Network*: Planned to launch in March, serving Africa, with Merlin partnership. Commercially supported, 30 percent music programming already produced. Patron is Archbishop Desmond Tutu, and other backers include Sir Peter Ustinov, and Trevor Bayliss (gh) For further information on Earth One see: <http://www.gvn.co.uk/earth1/pilot.htm> (Ray Woodward, British DX Club)

USA WORLD OF RADIO as timeshifted for DST from April 2, barring any further unforeseen changes: on WBCQ: Wed 2130 on 7415; on WWCN: Thu 2030 on 15685, Fri 0930 on 7435?, Sat 0300 on 3215, Sat 1130 on 15685, Sat 1630 on 12160, Sun 0230 and 0630 on 5070, Mon 0030 on 3215, Mon 0501 on 3210, Tue 1100 on 15685. For latest update see www.angelfire.com/ok/worldofradio

Neo-Nazi SW broadcaster Kevin Alfred Strom made a brief appearance on ABC's 20/20 Feb 9 in a story about women in the far right movement. One who has now seen the light is his ex-wife Kirsten Kaiser, who said, directly quoted, "I was married to a monster." They share custody of three children. She

was going to chat the next day; transcript of 20/20 can be found at www.abcnews.com (gh)

WBCQ-2, 9340, started regular broadcasting Feb 21: the Mon-Fri 8 am to 5 pm ET (then 1300-2200 UT) block was sold to Christian Media Network, a variety of talk programs. CMN deal was with James Lloyd who does *The Apocalypse Hour*. This is in compatible USB, carrier -6 dB, or roughly half of normal AM, so receivable on any cheap SW radio. One problem in running longer hours was finding techs qualified to handle 50 kW transmitters, willing to live in northern Maine in the winter, and take the pay WBCQ can offer. WBCQ has been pushing spot sales, and one of the first takers was Kurt "extreme weapons" Saxon, who is still salivating for the collapse of the USA. What peace, love and understanding! (gh)

On *Being Human* started late Jan on WBCQ 7415, Tue at 2230-2300, so if it still exists in April at 2130. Psychotherapists have a book *Eat or Be Eaten - The Marriage of Darwin and Machiavelli*. Gist of this: We have spent the last millennium denying our animal instinctual nature. We are evolutionary animals, using deception and aggression to survive. We are now in an age of intuition. From www.onbeinghuman.com: "As you go the way of life, you will see a great chasm. JUMP. It is not as wide as you think. Welcome to the Third Millennium." (gh)

VOA's new science show, *Our World* with Rob Sivak, is worth a listen, in the alternate odd UT xx:32:30 hours Saturdays when *Communications World* is not on such as 1932:30 on 15580 (gh, *DX Listening Digest*)

Ironically, in countries that demonize the United States such as Iran and Afghanistan, more people listen to Voice of America than any other foreign radio service, according to surveys in 1998 and 1999 by the VOA Office of Research. Some 91 million people each week listen to VOA worldwide, an increase of 5 million over 1998, the VOA reports. Half the listeners are concentrated in five countries: Nigeria, Bangladesh, China, Ethiopia and Afghanistan. The next five countries, in terms of numbers of listeners are Iran, Burma, Tanzania, India and Ukraine (Ben Barber, Washington *Times*)

When BBC is a total loss on Saturday mornings, try AFN 12689.5 USB in case these are still in effect: 1405-1430 *The Environment Show* from WAMC; 1505-1600 *Tech Nation* from KQED (gh) See www.ibm.com/industrytalk/technation/ (Chet Copeland, *DX Listening Digest*)

KALJ moved to another 50+ mb frequency at night, 5755 in an effort to find one that works better than 5835, 5810 (George McClintock, TN)

On 6900.00 WYFR at 1015, Spanish religious talk, 1030 ID. Weak // 6105 and 9555. (Mark Mohrmann, VT) 2 x 9555 minus 2 x 6105 = 6900, a strange mixing product (gh)

WINB tested 13570 in Feb (Bill Smith, TX, *hard-core-dx*)

URUGUAY According to *La Republica*, two SW channels have been granted permission for broadcasting, by government decree: one to the owner of R. Universo, possibly to use 6155; the other to R. Sarandí, which should use 6055. Rules give them one or two years to activate (Horacio Nigro, Uruguay, *DX Listening Digest*)

VENEZUELA List of SW stations here as of Feb:

4830 Radio Táchira, San Cristóbal, 10 kW 1000-1400 and 2100-0400.

Confirms with QSL.

4940 Radio Valera, Valera, 1 kW, irregular

4940 Radio Amazonas, Puerto Ayacucho, 1kW at 0900-0400

4980 Radio Ecos del Torbes, San Cristóbal, 10 kW at 0900-0400.

Confirms with QSL.

5000 Estación YVTO Observatorio Naval Cagigal, Caracas. utility station with legal time in Venezuela, 1 kW. Confirms with QSL.

9540 Radio Nacional de Venezuela, Antena Internacional, Caracas. 50 kW. One-hour broadcasts in Spanish at 1100, 1400, 1800, 2100, 0000, 0300. Confirms with QSL.

9640 Radio Ecos del Torbes. 1200-2200 to avoid interference from international stations, 10 kW (*Banda Tropical*, Club Diexistas de la Amistad, Venezuela)

Thais Silva de White (Mrs. Jeff White of WRMI) laments that Venezuelans abroad have little SW contact with the homeland, in the wake of the tremendous flooding and mudslide tragedy which killed and made thousands homeless. Since Radio Nacional de Venezuela cannot be heard outside the country, she proposes that her application for a Radio San Juan Internacional finally be granted a SW construction permit, to operate from San Juan de los Cayos in Falcon State (Letter to *La Razón* via Club Diexistas de la Amistad) A 60-meter band frequency was authorized to the station about two years ago; only the construction permit is needed now. It will be a relatively low-powered station. There is absolutely no connection whatsoever with Radio Miami International (Jeff White, FL, *DX Listening Digest*)

ZIMBABWE ZBC at 2120-2200* on 6045, new frequency for this time of day. Later heard report from Alexander on *WOR* that Zimbabwe hadn't been heard on "its usual frequencies" in several weeks. So I guess that they have been using 49 mb for a while. Seems to be trend among Africans these days to stay on the higher bands even in the local evenings, perhaps related to approaching solar maximum? (Hans Johnson, Feb 2, *Cumbre DX* via *DX Listening Digest*) ZBC dropped 3306 early in November, and Radio 4 is on 6045 only at 0300-2200; Radio 2 0300-0530 4828, 0530-1630 5975, 1630-2200 4828. ZBC now has a website at www.africaonline.co.zw/zbc/ (Dave Kernick, *DX Listening Digest*)

Until the Next, Best of DX and 73 de Glenn!

Gayle Van Horn

0019 UTC on 6479.5

PERU: Radio Altura. Spanish music to program jingles. Numerous time checks to station IDs. Peru's **Radio Ilican** 0102-0101, 5678 with Andean music and "Radio Ilucan" identification. (Daniele Canonica, Muggio, Switzerland/*Hard Core DX*) Peru's **Radio Union** 0700 on 6115 with IDs and ads. (Don Moman, Lamont, Alberta, Canada/*HCDX*) **Ondas del Rio Mayo** 0150-0154* on 6797.6. (Moman, CAN/*HardCoreDX*)

0020 UTC on 4515

PERU: Radio Amistad. Andean music to clear IDs. Additional monitoring on subsequent evening checks with IDs, jingles. (Kenneth Olofsson, Sweden/*HCDX*)

0032 UTC on 5975

ANTIGUA: BBC WS relay. *Health Matters* program. (Sue Wilden, Noblesville, IN)

0059 UTC on 13695

THAILAND: Radio Thailand. English service including weather report and time checks for 8 AM. Interval signal into Asian language program 0102. Strong signal, not noted on 9680. (Moman, CAN/*HCDX*)

0117 UTC on 15425

SRI LANKA: SLBC. Announcer's English with much enthusiasm noting, "everything is very, very good this morning and very, very best wishes." Station ID 0117 as "All Asia service of Radio Sri Lanka" into *Abundant Life* religious program. *Back to the Bible* program at 0200 recheck to SLBC ID. (Moman, CAN/*HCDX*) 4902, 19936-1954+, Koran recitations to 2000*; 4940, 2117 in dialect to 2202 Tamil service. (Zacharias Liangas, Thessaloniki, Greece/*HCDX*) **VOA relay** Colombo 15250, 0128. *VOA News Now* program, // 11705, 9455 excellent to the Americas, 11820 (ex 9740) 17740 (ex 17735), both to south Asia. (Walter Salmniw, Victoria, BC Canada/*HCDX*)

0157 UTC on 6010

ITALY: RAI. Segment on victims of the 79 A.D. eruption of Vesuvius found at Herculaneum. (Bob Fraser, Cohasset, MA)

0212 UTC on 4799.7

GUATEMALA: Radio Buenas Nuevas. Spanish. Religious text in Quecha to vocals and Spanish station ID. (Mark Veldhuis, Borne, Netherlands/*HCDX*) Guatemalan's **Radio Maya de Barillas** 3324.8, 0300-0330; **LV de Nahuala** 3360, 0308-0320. (Sam Wright, Biloxi, MS)

0600 UTC on 6185

MEXICO: Radio Educacion. Station IDs, features 0620-0700 with minimal interference from Vatican Radio (Lee Silvi, Mentor, OH) Audible 1436-1442. Spanish ballads to IDs. (Harold Frodge, Midland, MI)

0245 UTC on 6000

CUBA: Radio Havana. *Mailbag* program. (Wilden, IN) Cuba's **Radio Rebelde** 5025, 0015 with national news. (Frank Hillton, Charleston, SC)

0600 UTC on 6160

CANADA: CBN/CKZU St John's NF. Program on Shakespeare to station ID and weather report, monitored to 0630. CBC's **CHNK-Halifax, NS**, audible 6130, 0747 pop music show to station identification 0747. (Don Dacus, Russellville, AR) **CKZU-Vancouver** 6160, 0700-0815. (Silvi, OH) **BBC relay via Sackville** 9515, 1508-1530, *Football Extra* show. (Frodge, MI)

0738 UTC on 9780

ECUADOR: HCJB. SW logs noted from listeners. (Wilden, IN) *Studio 9* segment on 21455, 1920. (Fraser, MA)

1350 UTC on 15575

CYPRUS: BBC World Service relay. English service to Asia. Focus on Harry Potter book phenomena to sports roundup, // 15565 via **Rampish, UK**. (Brian Bagwell, St Louis, MO)

1400 UTC on 9465

NORTH MARIANAS: KFBS. Russian service clear to 1459. **Radio Free Asia**, Mariana Is 9455 // 9930 Vietnamese 1405-1445. Cantonese service also good on 9445. (Silvi, OH)

1427 UTC on 15140

OMAN: Radio Sultanate of Oman. English service time pips to station ID including news items past 1430. Fair quality signal. (Moman, CAN/*HCDX*)

1429 UTC on 5985.8

MYANMAR: Radio Myanmar. Interval signal tune to opening English ID as, "good evening, this is Myanmar Radio, Yongon." Pop songs with brief segments between tunes. (Veldhuis, NLD/*HCDX*)

1503 UTC on 6150

SINGAPORE: Radio Singapore Int'l. English pop music with mentions of FM service during ID, lots of interference noted. (Moman, CAN/*HCDX*)

1659 UTC on 5009.6

MADAGASCAR: Radio Madagascar. French identification to newscast, ending at 1713. Good signal for SIO 444. (Antonello Napolitano, Taranto, Italy/*HCDX*) ; 5009.5, 1714 & 1905 (Liangas, GRC/*HCDX*) **Radio Vlaanderen Int'l's relay** 13645, 1908 Dutch service to Africa. Frequency change to // 13600 (Julich, Germany) // 15365 poor (Belgium) // 17695 (Julich, Germany). Station address: B-1043 Brussels, Belgium. (Gayle Van Horn, Brasstown, NC)

1730 UTC on 5090

CHINA: CNR Beijing. Chinese to 1750. Flute music // 7620 weak; interference from 5091 numbers station. (Dean Willis, Aberdare, Wales, UK/*HCDX*)

1900 UTC on 13640

MOROCCO: VOA Relay. English world news to French service 2020 on 15220. Reggae's Bob Marley music to D.C. address and Pearl Jam tune. (Banks, TX)

1934 UTC on 4890

PAPUA NEW GUINEA: NBC. Western pop tunes to programming previews, fair signal for SIO 343. (Napolitano, Italy/*HCDX*) Monitored to 2030 with English programming, ID as, "Karai National Radio" at 2018. Fantastic signal for one hour! Additional monitoring 2030+.(Caponica, SUI/*HCDX*)

2015 UTC on 9720

MONGOLIA: Voice of Mongolia. Lady announcer reading article on history from local newspapers. Email address quote to closing programming bits at 2024. (Moman, CAN/*HCDX*)

2030 UTC on 12080

BOTSWANA: VOA relay. Hausa service. News topics on India, Pakistan, Nigeria and Iran to regional Botswana music. Station interval signal, station ID to 2130*. (Banks, TX)

2107 UTC on 5035

CENTRAL AFRICAN REP.: RDTV-Centrafrigue. French. Folk music to *History of Africa* feature. Recheck 2159 for announcer's chat, English pop tune, station ID, national anthem's 2258*. Fair quality with sporadic interferences on frequency. (Zacharias Liangas, Thessaloniki, Greece/*HCDX*)

1940 UTC on 13725

GERMANY: VOA relay via Lampertheim. Poor quality, pop/rock program from "thirty years ago this week," station ID to abrupt 1957 sign-off.. German domestics monitored as **Sudwestrundfunk** 7264.9, 2239. German. DJ's pop/rock/disco show, phone-ins to Santana's hit *Smooth* from Supernatural CD. ID to newscast 2300. **Deutschlandfunk** (Radio Bremen) 6190, 2258 with classical music to tips, newscast. **Deutschlandradio** 6005, 2305. **Deutsche Welle**'s German service 2310 on 3995, // 6075, 6100, 9545, 11785, 13780, 15375, 15410, 17860. (Van Horn, NC)

2020 UTC on 3320

SOUTH AFRICA: SABC. Fair signal for Afrikaans programming and pop music. (Liangas, GRC/*HCDX*) **BBC relay** via Meyerton 3255, 0245+. (Banks, TX)

2210 UTC on 9990

EGYPT: Radio Cairo. Fair-to good signal for *You Ask, We Answer* program to station ID and newscast. (Dacus, AR)

2315 UTC 4845

MAURITANIA: ORTM. Arabic service of fair quality for local Saturday evening show. Arabic regional music to phone interview format 2330. (Van Horn, NC) Possibly ORTM drifting 4838, 2016. (Liangas, GRC/*HCDX*)

2358 UTC on 4955

COLOMBIA: Radiodiff Nacional de Colombia. Pop Spanish music to English bits from DJ including address. Elvis music to "Nacional de Colombia" ID 0000 into salsa. (Banks, TX)

Thanks to our contributors — Have you sent in YOUR logs?
Send to **Gayle Van Horn**, c/o Monitoring Times (or e-mail gayle@webworkz.com)
English broadcast unless otherwise noted.

Czech Radio... Past and Present

Radio Prague is offering a series of eight postcard-sized QSLs, featuring photographs relating to the past and present of their station and Czech Radio, the public service broadcasting organization.

Cards of the past are 1920's era, featuring black and white photos from transmitters in Kbely, a studio photo from Radiojournal, the predecessor of Czech Radio, plus the first Czechoslovakian President Tomas Garrigue Masaryk in 1932, addressing United States listeners, and the first Czechoslovak Radio bus in 1935.

Present-day color cards include shortwave and television transmitter sites, studio buildings and a logo card representing today's Czech radio stations. This series is an interesting contrast for listeners to the Czech Republic over the years – one I would highly recommend you add to your collection. I have!



BAHRAIN

A9M-Hamala Radio, 12709 kHz. Full data QSL card. Received in 31 days for a utility report and one U.S. dollar. Station address: Bahrain Telecommunications Co., Maritime Operating Centre, Administrative Supervisor, P.O. Box 14, Manama, Bahrain. (George Clement, GA)

BRAZIL

Radio Rio Mar, 9695 kHz. Station verification letter signed by Jairo de Sousa Coelho-Diretor de Programacao e Jornalismo, plus postcard. Received in 35 days for a report (Portuguese?). Station address: Rua Jose Clemente 500, Manaus, Amazonas, Brazil. (Daniele Canonica, Muggio, Switzerland)

COLOMBIA

Emissora Ecos del Atrato, 5020 kHz. Station verification letter signed by Absalon Palacios Agualimpis-Administrador. Received in 75 days for a report (Spanish?) Station address: Carrera 4a N 25-28 A.A. 196, Quibdo-Choco, Colombia. (Canonica, SU1)

CZECH REPUBLIC

Radio Prague, 7345 kHz. Full data QSL cards for series one, three unsigned, plus stickers, pennant, schedule and key chain flashlight. Received in 16 days for three English reports, and one IRC. Station address: Vinohradska 12, Praha, Czech Rep. 120 99. (Anthony Maslanka, Cleveland, OH) <www.radio.cz>

IRELAND

Shannon Volmet, 5505 kHz USB. Full data QSL sheet signed by Harry O'Loughlin-Operations Manager, plus letter, info sheet and pamphlet. Received in 12 days for an English utility report, two IRCs and a picture postcard. Station address: Shannon Volmet, Ballygireen, Newmarket-on-Fergus, Co. Claire, Ireland. (Bill Wilkins, Springfield, MO; Sue Wilden, Noblesville, IN)

JAPAN

NHK/Radio Japan, 11705 kHz. Full data QSL card unsigned, plus sticker, newsletter and schedule. Received in 41 days for an English report and one IRC. Station address: 2-1, Jinnan 2-chome, Shibuya-ku, Tokyo, Japan 105-01. (Maslanka, OH)

MEDIUM WAVE

CBR, 1010 kHz AM. Station verification letter signed by Mike Spear-Administration Officer, plus stickers and business card. Received in 57 days for an AM report and a self-addressed envelope (SAE). Station address: 1724 Westmount Blvd NW, P.O. Box 2640, Calgary, Alberta T2P 2M7, Canada. (Terry Jones, Plankinton, SD)

CHRB, 1140 kHz AM. Full data verification letter signed by Operations Manager (illegible signature), plus blue/orange station logo sticker. Station slogan *Southern Alberta's Family Radio Station*. Received in 21 days for an AM report. Station address: 11-5th Ave. S.E., High River, Alberta T1V 1G2 Canada. (Lloyd Van Horn, Brassstown, NC)

KEYZ, 660 kHz AM. Verification letter signed by Earl Gross-Chief Engineer. Received in 300 days for a taped report of DX Test. Station address: P.O. Box 2048, Williston, ND 58801-2048. (Martin, CA)

KHPN, 1570 kHz AM. Prepared QSL card returned and signed by Carl Lang (?)-Operations Manager. Received in 14 days for an AM report. Station address: 1576 West First, Loveland, CO 80537. (Martin, CA)

KLIB, 1110 kHz AM, Roseville. Handwritten verification letter signed from Rosa Garnja-Sales. Received in ten days for an AM report. Station address: 3463 Ramona Ave., Ste. 15, Sacramento, CA 95826. (Martin, CA)

KNIM, 1580 kHz AM. Date only verification letter signed by Jim Cromin-Program Director. Received in 9 days for an AM report and an SASE. Station address: P.O. Box 278, Maryville, MO 64468. (Harold Frodge, Midland, MI)

WAFN, 1700 kHz AM. Verification letter signed by Cindy Roman. Received in 10 days for a taped report. Station address: 8525 NW 53rd Terrace, Ste. 109, Miami, FL 33166. (Martin, CA)

WTAM, 1100 kHz AM. Station verification letter signed by Ray Davis-Program Director. Received in 19 days for an AM report and an SASE. Station address: 1468 W. 9th St., Suite 805, Cleveland, OH 44113-1220. (Jones, SD)

SOUTH AFRICA

Channel Africa, 9525 kHz. Full data verification card signed by Kathy Otto, plus station stickers and schedules. Received in 33 days for an English report and one U.S. dollar. Station address: Sentech (Pty.) Ltd., X06, Honeydew 2040, South Africa. (Medlin, TN; Wright, MS)

UNITED KINGDOM

RTE via Rampisham, U.K., 6155 kHz. Full data prepared QSL card returned stamped and signed by Julie Hayde-Broadcasting Developments. Received in 17 days for an English report and an SAE (returned unused). Station address: Radio Telefis Eireann, P.O. Box 4950, Dublin 1, Ireland. <www.rte.ie/radio/> (Sam Wright, Biloxi, MS)

UNITED STATES

NMC-U.S. Coast Guard Communications Area Master Station-Pacific, 13089 kHz USB. (weather broadcast) Full data QSL card signed by K.R. Harrison TC1, plus schedule, CAMSPAC brochure and station history letter signed by L.R. Obanion, SCPO. Received in 14 days for a utility report. Station address: USCG CAMSPAC, 17000 Sir Francis Drake Blvd., P.O. Box 560, Point Reyes Station, CA 94956-0560. <www.uscg.mil/pacarea/campspac/menu.html>. (Scott Medlin, Cleveland, TN)

NMN-U.S. Coast Guard Communications Area Master Station-Atlantic, 12592.5 kHz USB. (weather broadcast) Full data QSL card. Received in 24 days for a utility report and one mint stamp. Station address: USCG CAMSLANT-NMN, Commanding Officer, c/o USCG CAMSLANT, 4720 Douglas A. Munro Rd., Chesapeake, VA 23322-4399. (Clement, GA) Verified 13089 kHz USB, full data card signed by F. Sherwood TCC (AL7HW/4) <www.uscg.mil/lantarea/camslant/index.htm>, (Medlin, TN) Full data card, 6501 kHz USB received in three weeks. (Sonny Baca, Las Cruces, NM)

NRV-U.S. Coast Guard Marianas Section Office Guam, 13089 kHz USB (weather broadcast). No data letter signed by S.M. Higbee TC3, plus schedule, and USCG Marianas Section unit patch. Received in 20 days for a utility report. Station address: Commander, USCG Marianas Section, Box 176, (Guam) FPO AP, 96540-1056. (Medlin, TN)

WTJC, 9370 kHz. Full data lighthouse card signed by A. Robinson, plus schedule, religious tract, and pocket calendar. Received in 14 days for a SASE. Station address: 520 Roberts Rd., Newport, NC 28570. (Wilkins, MO)

Self-Powered Radios!

Don't Let Power Outages Isolate You!



NEW! KA-007 Free-Power Radio!

The new Kaito KA-007 is only a fraction of the size and weight of its competitors, yet has even more features. Power it from its hand-cranked generator, or charge it from its high solar panel, or connect it to an external source of 4.5 to 6 VDC (AC adaptor included), or even run it on three replaceable AA cells! Its fully charged NiMH power plant will run the radio for up to 72 hours!

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Three LEDs assist in station tuning and assessing remaining battery power. AC charger/adaptor, manual, and small wire antenna included.

This multiband radio works anytime, anywhere, on a variety of power sources. Compact and loaded with frequency coverage, it automatically recharges itself in sun or room light. Reliable listening at the right price!

ORDER RCV 36 **Only \$59⁹⁵** plus \$5.95 UPS shipping or US Priority Mail

Sony ICF-B200

The ICF-B200 provides not only quality AM/FM reception in a tiny (6"x3"), lightweight (11 oz.) case, but also never needs batteries or sunlight to operate! That's right, a high efficiency, easy-hand-turned generator provides all the power needed for this radio—one minute's spin gives you a full 15 minutes of play time! And you can even install two AA alkaline batteries for many hours of unattended, extended operation! An LED status indicator alerts you to charge conditions.

The B200 has a built-in emergency guide light, and its display is illuminated as well. A headphone jack allows private listening, or you can call for help with the audible alarm. The bright, safety-orange color quickly locates the radio under all conditions.

Don't be caught without a source of emergency information! Call now to order your lifeline to the community!



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FreePlay FPR2S GSW

The sensational FreePlay FPR2S GSW radio is now available from Grove! Simply wind the generator spring for approximately 30 seconds and enjoy up to 45 minutes of reception! And during daylight, solar power operates the radio non-stop and charges its batteries!

The new FPR2S GSW radio provides 5.8-18 MHz shortwave reception in addition to AM/FM and solar power. Can also be operated using an optional AC power supply.



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web: www.grove-ent.com

e-mail: order@grove-ent.com

HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twtfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s Sunday
 m Monday
 t Tuesday
 w Wednesday
 h Thursday
 f Friday
 a Saturday

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "v" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports

from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af: Africa
 al: alternate frequency (occasional use only)
 am: The Americas
 as: Asia
 au: Australia
 ca: Central America
 do: domestic broadcast
 eu: Europe
 me: Middle East
 na: North America
 om: omnidirectional
 pa: Pacific
 sa: South America
 va: various

Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

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PROGRAM HIGHLIGHTS

JIM FRIMMEL, PROGRAMMING MANAGER

by Jim Frimmel

Program changes at the Voice of America in February resulted in improved weekend scheduling for worldwide English listeners.

Communications World enthusiasts had long been complaining about the dismemberment of the popular shortwave listener program into three nine-minute segments. Only a very dedicated listener knew when and where to find Kim Elliott's A, B, and C program segments on VOA's *NewsNow* program.

Many listeners switched their allegiance to WWCW and WBCQ where they could hear the entire program uninterrupted. Others resorted to downloading the RealAudio file from the World Radio Network for playback on their home computers. So, in February VOA reconstituted *Communications World* into a single, 27-minute production. By doing so, they were able to reduce the number of times that the program aired to seven times on Saturday (01, 05, 07, 09, 13, 17, and 21 hours, with all programs starting at 32 minutes past the hour).

The *Communications World* adjustments made room for other changes during some Saturday hours when *CW* was not aired. A new program called *Our World* now occupies the Saturday slots at 0332, 0732, 1132, 1532, 1932, and 2332 UTC. The new program is hosted by Rob Sivak and the content is broad enough to be just about any subject on Earth, although it is touted to be about science, technology, agriculture, and the natural environment. Rob is an old hand at VOA with vast experience in these fields.

Women in Business, another new 25-minute VOA program, can be heard on the second Sunday of each month at 0332, 0732, 1132, 1532, 1932, and 2332 UTC. Host Sarah Long has extensive experience reporting on government, science, history, the arts, and entertainment and has personal interests in bicycling and genealogy.

Kaleidoscope, another new Sunday program can be heard the 1st, 3rd, and 4th Sundays of each month at the same times *Women in Business* airs. Susan Logue hosts the program that examines different aspects of American culture, and has extensive experience in that field.

In other VOA news, personnel cuts in language services are on the block, along with transmission reductions. English to Africa is to be expanded.

FREQUENCIES

0100 0200	Anguilla, Caribbean Beacon	6090am			
0100 0200 vl	Australia, ABC/Katherine	5025do			
0100 0200 vl	Australia, ABC/Tennant Creek	4910do			
0100 0200	Australia, Radio	9660as	12080as	15240as	
		15415as	17580as	17750as	
		17795as	21725as		
		7375na	9400na		
0100 0200	Bulgaria, Radio	9625do			
0100 0200	Canada, CBC N Quebec Svc	6070do			
0100 0200	Canada, CFRX Toronto	6030do			
0100 0200	Canada, CFVP Calgary	6130do			
0100 0200	Canada, CHNX Halifax	6160do			
0100 0200	Canada, CKZU St John's	6160do			
0100 0200	Canada, CKZU Vancouver	6975va	15050va		
0100 0200	Costa Rica, RF Peace Intl	6000na	9820na	11705na	
	Cuba, Radio Havana	13605na			
0100 0127	Czech Rep, R Prague Intl	7345na	9665na		
0100 0200	Ecuador, HCJB	9745na	12015na	21455va	
0100 0145	Germany, Deutsche Welle	6040na	6145am	9640na	
		9700na	9765na		
0100 0200 s	Germany, Good News World R	9855eu			
0100 0130 s	Germany, Universal Life	9495as			
0100 0130 m	Germany, V of Deliverance	6120na			
0100 0200 vl	Guatemala, Radio Cultural	3300do			
0100 0200	Indonesia, Voice of	9525va			
0100 0130	Iran, VOIRI	9022am	9795ca	11970na	
0100 0110	Italy, RAI Intl	6010na	9675na	11800na	
0100 0200	Japan, Radio/NHK	9660me	11860as	11870me	
		15325as	15590as	17685au	
		17835sa	21670pa		
0100 0200	Kenya, Kenya BC Corp	4885do			
0100 0130	Kiribati, Radio	9810do			
0100 0200	Liberia, LCN/R Liberia Int	5100do			
0100 0200	Malaysia, Radio	7295do			
0100 0200 vl	Malaysia, RTM Kota Kinabalu	5980do			
0100 0130	Mexico, Radio Mexico Intl	9705am			
0100 0200	Namibia, NBC	3270af	3289af		
0100 0125	Netherlands, Radio	6165na	9845na		
0100 0200	New Zealand, R NZ Intl	17675va			
0100 0156	North Korea, R Pyongyang	3560va	11735va	15229va	
		17734va			
0100 0200 vl	Papua New Guinea, NBC	9675do			
0100 0200	Philippines, FEBC R Intl	15175as			
0100 0200	Singapore, Radio Corp Singapore	6150do			
0100 0130	Slovakia, R Slovakia Intl	9930na	7300ca	9440sa	
0100 0200 vl	Solomon Islands, SIBC	5020do			
0100 0200	Spain, R Exterior Espana	6055na			
0100 0200	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9730as
		15425as			
0100 0130	Switzerland, Swiss R Intl	9885am	9905am		
0100 0200	UK, BBC World Service	5965as	5975na	6175na	6195as
		9410as	9590am	9915am	11955as
		12095sa	15280as	15310as	15360as
		17790as			
0100 0200 a	UK, Merlin Network One	3985eu	6180eu	7165eu	
0100 0200	USA, Armed Forces Network	4278am	6478am	12689am	
0100 0200	USA, KAJI Dallas TX	5835va			
0100 0200	USA, KJES Vado NM	7555na			
0100 0200	USA, KTBN Salt Lake City UT	7510na			
0100 0200	USA, KWHR Naalehu HI	17510as			
0100 0200	USA, Voice of America	7200as	9740as	9850as	15300as
		15300as	17740as	17820as	
0100 0200 twhf	USA, Voice of America	5995am	6130am	7405am	9455af
		9775am	13740am		
0100 0200	USA, WBCQ Monticello ME	7415na			
0100 0200	USA, WEWN Birmingham AL	5825na	9355eu		
0100 0200	USA, WGTG McCaysville GA	5085va	6890am		
0100 0200	USA, WHRA Greenbush ME	7580na			
0100 0200	USA, WHRI Noblesville IN	5745na	7315na		
0100 0200	USA, WINB Red Lion PA	11950am			
0100 0200	USA, WJCR Upton KY	7490na	13595na		
0100 0145 m	USA, WRMI/R Miami Intl	9955am			
0100 0200	USA, WRNO New Orleans LA	7355na			
0100 0200	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0100 0200	USA, WTJC Newport NC	9370na			
0100 0200 as	USA, WWBS Macon GA	11900na			
0100 0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100 0200	USA, WYFR Okeechobee FL	6065na	9505na	11750as	
0100 0130	Uzbekistan, R Tashkent	9540as			
0100 0127	Vietnam, Voice of	5940na			
0110 0120	Kyrgyzstan, Kyrgyz Radio	4010eu	4050eu		
0115 0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0115 0145 as	Monaco, Trans World Radio	6240as			
0130 0145	Albania, R Tirana Intl	6115na	7160na		
0130 0200	Lithuania, Radio Vilnius	6120na			
0130 0200	Sweden, Radio	7290as	9495al		
0130 0200	UK, RTE Radio	6155eu			
0130 0200 twhf	USA, VOA Special English	7405am	9775am		
0140 0150	Greece, Voice of	7450na	9375na	9420na	
0140 0200	Vatican City, Vatican R	7335as	9650au	12055va	
0145 0200 twhf	USA, WRMI/R Miami Intl	9955am			

SELECTED PROGRAMS

Sundays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): Latin and International News. Ten minutes of regional and world news.
 0100 Germany, DW: News. World news from Deutsche Welle.
 0105 Australia, Radio: The Europeans. Maria Zijlstra presents reports and features on aspects of European politics, culture and society.
 0106 Germany, Deutsche Welle: Saturday Review. A Saturday update of current events and sports in Germany.
 0110 Ecuador, HCJB Quito (am): DX Partyline. Allen Graham gives you plenty of information to help you get more fun out of shortwave listening.
 0115 Germany, DW: Inside Europe. The radio magazine that offers a European perspective on events of the week.
 0145 Germany, Deutsche Welle: Living in Germany. A weekly look at the social and political issues in the 1990s.

Mondays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
 0100 Germany, Deutsche Welle: News. See S 0100.
 0106 Germany, DW: Religion and Society. See S 1106.
 0110 Australia, Radio: Away! Lorena Allam hosts a program of indigenous arts and issues.
 0110 Ecuador, HCJB Quito (am): Musical Mailbag. HCJB staffers have a good time reading listener letters and playing music.
 0115 Germany, Deutsche Welle: Arts on the Air. See S 1615.

Tuesdays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): News. A summary of world and

regional news.

- 0100 Germany, Deutsche Welle: News. See S 0100.
 0106 Germany, Deutsche Welle: NewsLink. See M 1106.
 0110 Australia, Radio: Science Show. Robyn Williams presents the world of science, both at home and abroad.
 0110 Ecuador, HCJB Quito (am): Studio 9. Jeff Ingram is your tour director daily travel and in Latin America.
 0130 Ecuador, HCJB Quito (am): Inside HCJB. Paul Bell gives you a inside look at the Voice of the Andes.
 0130 Germany, Deutsche Welle: Man and Environment. See S 1245.
 0145 Germany, Deutsche Welle: The History of Germany. See S 1645.

Wednesdays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): News. See T 0100.
 0100 Germany, Deutsche Welle: News. See S 0100.
 0106 Germany, Deutsche Welle: NewsLink. See M 1106.
 0110 Australia, Radio: The National Interest. See S 1605.
 0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
 0130 Ecuador, HCJB Quito (am): El Mundo Futuro. Allen Graham with the world of science and technology and "Computer Corner".
 0130 Germany, Deutsche Welle: Insight. A weekly analysis of major developments on the international scene.
 0145 Germany, Deutsche Welle: German by Radio. An advanced German language course for English speakers.

Thursdays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): News. See T 0100.
 0100 Germany, Deutsche Welle: News. See S 0100.
 0106 Germany, Deutsche Welle: NewsLink. See M 1106.
 0110 Australia, Radio: Background Briefing. Australia's top award-winning current affairs program.

- 0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
 0130 Ecuador, HCJB Quito (am): Ham Radio Today. John Beck with features, tips, news, and helps for radio amateurs.
 0130 Germany, Deutsche Welle: Living in Germany. See S 0145.
 0145 Germany, Deutsche Welle: Living in Germany. See S 0145.

Fridays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): News. See T 0100.
 0100 Germany, Deutsche Welle: News. See S 0100.
 0106 Germany, Deutsche Welle: NewsLink. See M 1106.
 0110 Australia, Radio: Hindsight. See H 1605.
 0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
 0130 Ecuador, HCJB Quito (am): Woman to Woman. Focus on topics of concern with Phyllis Wallace.
 0130 Germany, Deutsche Welle: Spotlight on Sport. Weekly magazine with background stories and coverage of important events.
 0145 Germany, Deutsche Welle: Insight. See W 0130.

Saturdays

- 0100 Australia, Radio: RA News. See S 0000.
 0100 Ecuador, HCJB Quito (am): News. See T 0100.
 0100 Germany, Deutsche Welle: News. See S 0100.
 0105 Australia, Radio: Oz Sounds. See S 0430.
 0106 Germany, Deutsche Welle: NewsLink. See M 1106.
 0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
 0130 Australia, Radio: Arts Talk. See W 2330.
 0130 Ecuador, HCJB Quito (am): Musica del Ecuador. Jorge Zambrano presents a unique mix of Ecuadorian music and friendly chatter (highly rated).
 0130 Germany, Deutsche Welle: German by Radio. See W 0145.
 0145 Germany, Deutsche Welle: Development Forum Asia. See S 1230.

FREQUENCIES

0200 0300	Anguilla, Caribbean Beacon	6090am	0200 0300	Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	9730as
0200 0300 twhfa	Argentina, RAE	11710am			15425as			
0200 0300 vl	Australia, ABC/Katherine	5025do	0200 0300	Taiwan, Radio Taiwan Intl	5950na	9680na	11740as	11825pa
0200 0300 vl	Australia, ABC/Tennant Creek	4910do			15345as			
0200 0300	Australia, Radio	9660as 12080as 15240as	0200 0206 a	UK, BBC World Service	6195as			
		15415as 15515as 17580as	0200 0300	UK, BBC World Service	5975na	6135am	6175na	6185am
		17750as 21725as			9410as	9770af	9915eu	11955as
0200 0210	Bangladesh, Bangla Betar	4880as			12095sa	15280as	15310as	17790as
0200 1215	Cambodia, Natl Radio Of	11940as	0200 0300	Ukraine, Radio Ukraine Intl	5905eu	6020va	6030na	6080eu
0200 0300	Canada, CBC N Quebec Svc	9625do			7205eu	7420eu	9560eu	9610eu
0200 0300	Canada, CFRX Toronto	6070do			9785na	9810va		
0200 0300	Canada, CFVP Calgary	6030do	0200 0300	USA, Armed Forces Network	4278am	6458am	12689am	
0200 0300	Canada, CHNX Halifax	6130do	0200 0300	USA, KAJI Dallas TX	5835na			
0200 0300	Canada, CKZN St John's	6160do	0200 0230	USA, KJES Vado NM	7555na			
0200 0300	Canada, CKZU Vancouver	6160do	0200 0300	USA, KTVN Salt Lake City UT	7510na			
0200 0300	Canada, Radio Canada Intl	6155am 9535am 9755am	0200 0300	USA, KWHR Naalehu HI	17510as			
		9780am 11865am	0200 0300	USA, Voice of America	7200as	9740as	9850as	11705as
0200 0300	Costa Rica, RF Peace Intl	6975va 15050va			15250as	15300as	17740as	17820as
0200 0300	Cuba, Radio Havana	6000na 9820na 11705na	0200 0300	USA, WBCQ Monticello ME	7415na			
		13605na	0200 0300	USA, WEWN Birmingham AL	5825na			
0200 0227	Czech Rep, R Prague Intl	6200na 7345na	0200 0300	USA, WGTG McCaysville GA	5085va	6890am		
0200 0300	Ecuador, HCBJ	9745na 12015na 21455va	0200 0300	USA, WHRA Greenbush ME	7580na			
0200 0300	Egypt, Radio Cairo	9475am	0200 0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200 0245	Germany, Deutsche Welle	7285as 9615as 9765as	0200 0300	USA, WINB Red Lion PA	11950am			
		11965as	0200 0300	USA, WJCR Upton KY	7490na	13595na		
0200 0300	Kenya, Kenya BC Corp	4935do	0200 0300 mtwhfa	USA, WRMI/R Miami Intl	7385am			
0200 0300	Malaysia, Radio	7295do	0200 0300	USA, WRNO New Orleans LA	7355na			
0200 0230	Myanmar, Radio	7185do	0200 0300 vl	USA, WSHB Cypress Crk SC	5850na	7535ca	9430na	
0200 0300	Namibia, NBC	3270af 3289af	0200 0300	USA, WTJC Newport NC	9370na			
0200 0300	New Zealand, R NZ Intl	17675va	0200 0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200 0256	North Korea, R Pyongyang	11844va 13649va	0200 0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200 0300 vl	Papua New Guinea, NBC	9675do	0215 0220	Nepal, Radio	3230as	5005as		
0200 0256	Romania, R Romania Intl	9510as 9570na 9690as	0230 0300	Austria, Radio Austria Intl	7325na			
		11740as 11830as 11940as	0230 0245	Pakistan, Radio	9640as	15485as	17660as	17895as
0200 0230 mtwhfa	Serbia, Radio Yugoslavia	7115na	0230 0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0200 0300	Singapore, Radio Corp Singapore	6150do	0230 0300	Sweden, Radio	7290na	9495al		
0200 0300 vl	Solomon Islands, SIBC	5020do	0230 0257	Vietnam, Voice of	5940na			
0200 0300	South Korea, R Korea Intl	7275as 11725sa 11810sa	0250 0300	Vatican City, Vatican R	7305am	9605am		
		15575na	0257 0300 vl	Malawi, MBC	3380do			

SELECTED PROGRAMS

Sundays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0206 Germany, Deutsche Welle: Saturday Review. See S 0106.
0210 Australia, Radio: Fine Music Australia. The best Australian fine music performances and compositions are presented by Ivan Lloyd.
0215 Germany, Deutsche Welle: Mailbag Asia. Listener mail from Asia is answered.
0230 Australia, Radio: Innovations. Desley Blanch reports on Australian inventions and innovative practices.
0245 Germany, Deutsche Welle: Living in Germany. See S 0145.

Mondays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0200 USA, WRMI/R Miami Intl, FL: Gospel Across the World.
0206 Germany, Deutsche Welle: Sunday Review. See S 2306.
0210 Australia, Radio: The World Today. Tony Eastley with current affairs updates.
0215 Germany, Deutsche Welle: Marks and Markets. See S 0515.
0215 USA, WRMI/R Miami Intl, FL: Truth for the World.
0230 USA, WRMI/R Miami Intl, FL: The Carter Report.

Tuesdays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0206 Germany, Deutsche Welle: NewsLink. See M 1106.
0210 Australia, Radio: The World Today. See M 0210.
0230 Germany, Deutsche Welle: Man and Environment. See S 1245.

- 0230 USA, WRMI/R Miami Intl, FL: Viva Miami!
0245 Germany, Deutsche Welle: The History of Germany. See S 1645.

Wednesdays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0206 Germany, Deutsche Welle: NewsLink. See M 1106.
0210 Australia, Radio: The World Today. See M 0210.
0230 Germany, Deutsche Welle: Insight. See W 0130.
0230 USA, WRMI/R Miami Intl, FL: Viva Miami!
0245 Germany, Deutsche Welle: German by Radio. See W 0145.

Thursdays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0206 Germany, Deutsche Welle: NewsLink. See M 1106.
0210 Australia, Radio: The World Today. See M 0210.
0230 Germany, Deutsche Welle: Living in Germany. See S 0145.
0230 USA, WRMI/R Miami Intl, FL: Viva Miami!
0245 Germany, Deutsche Welle: Man and Environment. See S 1245.

Fridays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0206 Germany, Deutsche Welle: NewsLink. See M 1106.
0210 Australia, Radio: The World Today. See M 0210.
0230 Germany, Deutsche Welle: Spotlight on Sport. See F 0130.
0230 USA, WRMI/R Miami Intl, FL: Viva Miami!
0245 Germany, Deutsche Welle: Insight. See W 0130.

Saturdays

- 0200 Australia, Radio: RA News. See S 0000.
0200 Germany, Deutsche Welle: News. See S 0100.
0205 Australia, Radio: Ockham's Razor. See S 0410.
0206 Germany, Deutsche Welle: NewsLink. See M 1106.
0230 Australia, Radio: Earthbeat. See M 2330.
0230 Germany, Deutsche Welle: German by Radio. See W 0145.
0230 USA, WRMI/R Miami Intl, FL: Viva Miami!
0245 Germany, Deutsche Welle: Development Forum Asia. See S 1230.

A NOTE RE DEUTSCH WELLE SCHEDULES

You'll note for some hours that the Deutsche Welle selected programming does not reconcile with the time on-air. The programming at 0000 is not available over shortwave, but it is broadcast via satellite and over the internet. Where the station is listed as off-air at :45, there is a European broadcast on 6140 which continues to the end of the hour. This should also be audible over the Internet. See www.dwelle.de/english/

FREQUENCIES

0300 0400	Anguilla, Caribbean Beacon	6090am			
0300 0400 vl	Australia, ABC/Katherine	5025do			
0300 0400 vl	Australia, ABC/Tennant Creek	4910do			
0300 0400	Australia, Radio	9660as	12080as	15240as	
		15415as	15515as	17580as	
		17750as	21725as		
		4820do	7255do		
0300 0400 vl	Botswana, Radio	9625do			
0300 0400	Canada, CBC N Quebec Svc	6070do			
0300 0400	Canada, CFRX Toronto	6030do			
0300 0400	Canada, CHNX Halifax	6130do			
0300 0400	Canada, CKZN St John's	6160do			
0300 0400	Canada, CKZU Vancouver	6160do			
0300 0329	Canada, Radio Canada Intl	6155na	9755na	9780na	
0300 0356	China, China Radio Intl	9690am			
0300 0400	Costa Rica, RF Peace Intl	6975va	15050va		
0300 0400	Cuba, Radio Havana	6000na	9820na	11705na	
		13605na			
0300 0400	Ecuador, HCJB	9745na	12015na	21455va	
0300 0330	Egypt, Radio Cairo	9475am			
0300 0320 m	Finland, YLE/R Finland	9655eu	11665eu		
0300 0330	Finland, YLE/R Finland	9655na	11665na		
0300 0345	Germany, Deutsche Welle	6045na	9535na	9640na	
		9700na	11750na		
0300 0310 mtwhf	Greece, Voice of	7450na	9375na	9420na	
		12105na			
0300 0400 vl	Guatemala, Radio Cultural	3300do			
0300 0330	Hungary, Radio Budapest	9835na			
0300 0400	Japan, Radio/NHK	17825ca	21610pa		
0300 0400	Kenya, Kenya BC Corp	4885do	4935do		
0300 0400 vl	Lesotho, Radio	4800do			
0300 0400	Malaysia, Radio	7295do			
0300 0400	Malaysia, Voice of	6175as	9750as	15295as	
0300 0400	Namibia, NBC	3270af	3289af		
0300 0400	New Zealand, R NZ Intl	17675va			
0300 0400	Oman, Radio Sultanate of	15355va			
0300 0330	Pakistan, Radio	6070do			
0300 0400 vl	Papua New Guinea, NBC	9675do			
0300 0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300 0400	Russia, Voice of Russia WS	7180na	12020na	13665na	
		15470na			
0300 0330	S Africa, AWR Africa	9835af			
0300 0330	S Africa, Channel Africa	9525af			
0300 0330	Serbia, Radio Yugoslavia	7130na			
0300 0400	Singapore, Radio Corp Singapore	6150do			
0300 0400	Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	
		9730as	15425as		
0300 0400	Taiwan, Radio Taiwan Intl	5950na	9680na	11745as	
0300 0330	Thailand, Radio	9655am	11825as	15345as	
0300 0400	Uganda, Radio	4976do	11905am	15460na	
0300 0400	UK, BBC World Service	3255af	5975na	6005af	6135am
		6175na	6190af	6195eu	7160af
		9410eu	11730af	11760me	11765af
		11955as	12095af	15310as	15360as
		17760as	17790as	21660as	
0300 0400 smtwhf	UK, BBC World Service	15280as			
0300 0330	UK, Merlin Network One	9735am			
0300 0400	USA, Armed Forces Network	4278am	6458am	12689am	
0300 0400	USA, KAU Dallas TX	5835va			
0300 0400	USA, KTN Salt Lake City UT	7510na			
0300 0400 vl	USA, KVOH Los Angeles CA	9975am			
0300 0400	USA, KWHR Naalehu HI	17510as			
0300 0330 mtwh	USA, Voice of America	4960af			
0300 0400	USA, Voice of America	6035af	6080af	7105af	7290af
		7340af	7415af	9575af	9885af
		7415na			
0300 0400	USA, WBCQ Monticello ME	5825na			
0300 0400	USA, WEWN Birmingham AL	5085va	6890am		
0300 0400	USA, WGTX McCalysville GA	7580na			
0300 0400	USA, WHRA Greenbush ME	5745na	7315sa		
0300 0400	USA, WHRI Noblesville IN	11950am			
0300 0400	USA, WINB Red Lion PA	7490na	13595na		
0300 0400	USA, WJCR Upton KY	7395na			
0300 0400	USA, WRNO New Orleans LA	5850na	7535eu		
0300 0400	USA, WTJC Newport NC	9370na			
0300 0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300 0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300 0315	Vatican City, Vatican R	7305am	9605am		
0300 0400	Zambia, ZBC Radio 4	4828do			
0300 0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0305 0310	Croatia, Croatian Radio	7280na			
0305 0320 mtwhfa	UK, BBC World Service	15360as			
0310 0340	Vatican City, Vatican R	9660af			
0329 0359 sm	Canada, Radio Canada Intl	6155na	9755na	9780na	
0330 0400	Albania, R Tirana Intl	6115na	7160na		
0330 0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0330 0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330 0400	Sweden, Radio	9495na			
0330 0400	Tanzania, Radio	5050af			
0330 0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0330 0357	Vietnam, Voice of	7260sa			
0340 0350	Greece, Voice of	7450na	9375na	9420na	
0345 0400	Tajikistan, Radio	7245as	9905as	11620as	
0357 0400 vl	Malawi, MBC	5993do			
0359 0400	Zambia, Christian Voice	6065do			

SELECTED PROGRAMS

Sundays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. Five minutes of international news from the land of the wind-up radio.
 0305 Australia, Radio: Correspondents' Report. See S 0010.
 0306 Germany, Deutsche Welle: Saturday Review. See S 0106.
 0315 Germany, Deutsche Welle: Spectrum. A magazine program presenting a broad range of new developments in science and technology.
 0330 Australia, Radio: Feedback. Roger Broadbent answers letters and discusses new programs, reception problems, and questions about Australia.
 0345 Germany, Deutsche Welle: Living in Germany. See S 0145.

Mondays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. See S 0300.
 0300 USA, WRMI/R Miami Intl, FL: Upward Look.
 0306 Germany, Deutsche Welle: Religion and Society. See S 1106.
 0310 Australia, Radio: The Margaret Throsby Interview. No information available.
 0315 Germany, Deutsche Welle: Arts on the Air. See S 1615.

Tuesdays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. See S 0300.
 0300 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
 0306 Germany, Deutsche Welle: NewsLink. See M 1106.
 0310 Australia, Radio: The Margaret Throsby Interview. See M 0310.
 0330 Germany, Deutsche Welle: Man and Environment. See S 1245.
 0345 Germany, Deutsche Welle: The History of Germany. See S 1645.

Wednesdays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. See S 0300.
 0300 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
 0306 Germany, Deutsche Welle: NewsLink. See M 1106.
 0310 Australia, Radio: The Margaret Throsby Interview. See M 0310.
 0330 Germany, Deutsche Welle: Insight. See W 0130.
 0345 Germany, Deutsche Welle: German by Radio. See W 0145.

Thursdays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. See S 0300.
 0300 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
 0306 Germany, Deutsche Welle: NewsLink. See M 1106.
 0310 Australia, Radio: The Margaret Throsby Interview. See M 0310.

- 0330 Germany, Deutsche Welle: Living in Germany. See S 0145.
 0345 Germany, Deutsche Welle: Man and Environment. See S 1245.

Fridays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: News. See S 0300.
 0300 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
 0306 Germany, Deutsche Welle: NewsLink. See M 1106.
 0310 Australia, Radio: The Margaret Throsby Interview. See M 0310.
 0330 Germany, Deutsche Welle: Spotlight on Sport. See F 0130.
 0345 Germany, Deutsche Welle: Insight. See W 0130.

Saturdays

- 0300 Australia, Radio: RA News. See S 0000.
 0300 Germany, Deutsche Welle: News. See S 0100.
 0300 S Africa, Channel Africa: Network Africa. See S 0505.
 0300 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
 0305 Australia, Radio: Rural Reporter. See H 2330.
 0306 Germany, Deutsche Welle: NewsLink. See M 1106.
 0330 Australia, Radio: Lingua Franca. Words and their stories.
 0330 Germany, Deutsche Welle: German by Radio. See W 0145.
 0345 Australia, Radio: Book Reading. Serialized readings of the best Australian novels.
 0345 Germany, Deutsche Welle: Development Forum Asia. See S 1230.

FREQUENCIES

0400 0500		Anguilla, Caribbean Beacon	6090am			0400 0500		UK, BBC World Service	3255af	3955eu	5975na	6005af
0400 0500 vl		Australia, ABC/Katherine	5025do						6135am	6175na	6190af	
0400 0500 vl		Australia, ABC/Tennant Creek	4910do						6195eu	7160af	9410eu	
0400 0500		Australia, Radio	9660as	12080as	15240as				11760me	11765af	11955as	
			15415as	15515as	17580as				12095af	15310as	15420af	
			17750as	21725as					15575as	17760as	17790as	
0400 0430 smwfa		Belarus, Radio Minsk	6070eu	7210eu					21660as			
0400 0500 vl		Botswana, Radio	4820do	7255do		0400 0500		USA, Armed Forces Network	4278am	6458am	12689am	
0400 0500		Bulgaria, Radio	7375na	9400na		0400 0500		USA, KAIJ Dallas TX	5835va			
0400 0500		Canada, CBC N Quebec Svc	9625do			0400 0500		USA, KTVN Salt Lake City UT	7510na			
0400 0500		Canada, CFRX Toronto	6070do			0400 0500 vl		USA, KVOH Los Angeles CA	9975am			
0400 0500		Canada, CFVP Calgary	6030do			0400 0500		USA, KWHR Naalehu HI	17780as			
0400 0500		Canada, CHNX Halifax	6130do			0400 0500		USA, Voice of America	6035af	6080af	7170af	7290af
0400 0500		Canada, CKZN St John's	6160do						7415af	9575af	9775af	9885af
0400 0500		Canada, CKZU Vancouver	6160do			0400 0500		USA, WBCQ Monticello ME	7415na			
0400 0429 as		Canada, Radio Canada Intl	9505me	9645me		0400 0500		USA, WEWN Birmingham AL	5825na			
0400 0429 mtwhf		Canada, Radio Canada Intl	9535af	9690af	11795af	0400 0500		USA, WGTG McCaysville GA	5085va	6890am		
0400 0456		China, China Radio Intl	9730na			0400 0500		USA, WHRA Greenbush ME	7580na			
0400 0500		Costa Rica, RF Peace Intl	6975va	15050va		0400 0500		USA, WHRI Noblesville IN	5745na	7315sa		
0400 0500		Cuba, Radio Havana	6000na	9820na	11705na	0400 0500		USA, WINB Red Lion PA	11950am			
			13605na			0400 0500		USA, WJCR Upton KY	7490na	13595na		
0400 0427		Czech Rep, R Prague Intl	7345na	7465na	9435na	0400 0500		USA, WRMI/R Miami Intl	7385na			
0400 0500		Ecuador, HCJB	9745na	12015na	21455va	0400 0500		USA, WRNO New Orleans LA	7395na			
0400 0445		Germany, Deutsche Welle	7280af	9565af	9765af	0400 0500		USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
			11965af			0400 0500		USA, WTJC Newport NC	9370na			
0400 0500 irreg		Iraq, Radio Iraq Intl	9685va	11787va		0400 0500		USA, WWCR Nashville TN	2390na	3215na	5070na	
0400 0500		Kenya, Kenya BC Corp	4885do	4935do					5935na			
0400 0500 vl		Lesotho, Radio	4800do			0400 0500		USA, WYFR Okeechobee FL	6065na	9505na	9985na	
0400 0500 vl		Malawi, MBC	3380do	5995do		0400 0500		Zambia, Christian Voice	6065do			
0400 0500		Malaysia, Radio	7295do			0400 0500		Zambia, ZBC Radio 4	4848do			
0400 0500		Namibia, NBC	3270af	3289af		0400 0500 vl		Zimbabwe, Zimbabwe BC	3396do			
0400 0500		New Zealand, R NZ Intl	17675va			0405 0410		Croatia, Croatian Radio	7280na			
0400 0500 vl		Nigeria, Radio/Enugu	6025do			0410 0415 thfa/vl		Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0400 0430 vl		Nigeria, Radio/Kaduna	6090do			0425 0440 vl		Italy, RAI Intl	5975af	7150af		
0400 0500 vl		Papua New Guinea, NBC	9675do			0430 0500 mtwhf		Canada, Radio Canada Intl	9690af	11795af		
0400 0456		Romania, R Romania Intl	9570na	11830as	15335as	0430 0457		Czech Rep, R Prague Intl	9865va	11600va		
			17735as			0430 0500		Hungary, Radio Budapest	9835na			
0400 0500		Russia, Voice of Russia WS	5940na	7180na	12020na	0430 0455		Moldova, R Moldova Intl	7500am			
			13665na	15470na		0430 0500		Netherlands, Radio	6165na	9590na		
0400 0500		S Africa, Channel Africa	5955af			0430 0500 vl		Nigeria, Radio/Ibadan	6050do			
0400 0500		Singapore, Radio Corp Singapore	6150do			0430 0500 vl		Nigeria, Radio/Kaduna	4770do	6090do		
0400 0430		Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	0430 0500 vl		Nigeria, Radio/Lagos	3326do	4990do		
			9730as	15425as		0430 0457		Russia, Voice of Russia WS	7260na			
			9885am	9905am		0430 0500		Swaziland, Trans World R	3200af	4775af		
0400 0430		Switzerland, Swiss R Intl	5050af			0455 0500		Malaysia, Voice of	6175as	9750as	15295as	
0400 0500		Tanzania, Radio	4976do			0455 0500		Nigeria, Voice of	7255af	15120va		
		Uganda, Radio										

SELECTED PROGRAMS

Sundays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0406 Germany, Deutsche Welle: Saturday Review. See S 0106.
0410 Australia, Radio: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
0415 Germany, Deutsche Welle: Inside Europe. See S 0115.
0430 Australia, Radio: Oz Sounds. Thirty minutes of music selections by Radio Australia announcers.
0445 Germany, Deutsche Welle: Living in Germany. See S 0145.

Mondays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0400 USA, WRMI/R Miami Intl, FL: Upward Look.
0406 Germany, Deutsche Welle: Sunday Review. See S 2306.
0410 Australia, Radio: The World Today (repeat). See M 0210.
0415 Germany, Deutsche Welle: Marks and Markets. See S 0515.

Tuesdays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0400 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0406 Germany, Deutsche Welle: NewsLink. See M 1106.
0410 Australia, Radio: The World Today (repeat). See M 0210.

- 0430 Germany, Deutsche Welle: Good Morning Africa. Music, gossip and listeners' messages for and from Africa.
0445 Germany, Deutsche Welle: The History of Germany. See S 1645.

Wednesdays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0400 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0406 Germany, Deutsche Welle: NewsLink. See M 1106.
0410 Australia, Radio: The World Today (repeat). See M 0210.
0430 Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0445 Germany, Deutsche Welle: German by Radio. See W 0145.

Thursdays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0400 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0406 Germany, Deutsche Welle: NewsLink. See M 1106.
0410 Australia, Radio: The World Today (repeat). See M 0210.
0430 Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0445 Germany, Deutsche Welle: Man and Environment. See S 1245.

Fridays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.

- 0400 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0406 Germany, Deutsche Welle: NewsLink. See M 1106.
0410 Australia, Radio: The World Today (repeat). See M 0210.
0430 Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0445 Germany, Deutsche Welle: Insight. See W 0130.

Saturdays

- 0400 Australia, Radio: RA News. See S 0000.
0400 Germany, Deutsche Welle: News. See S 0100.
0400 S Africa, Channel Africa: News. See S 0300.
0400 USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0406 Germany, Deutsche Welle: NewsLink. See M 1106.
0410 Australia, Radio: Pacific Focus. See S 0605.
0430 Australia, Radio: Jazz Notes. See S 1105.
0430 Germany, Deutsche Welle: German by Radio. See W 0145.
0445 Germany, Deutsche Welle: Development Forum Asia. See S 1230.

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FREQUENCIES

0500 0600	Anguilla, Caribbean Beacon	6090am				0500 0505	Swaziland, Trans World R	4775af	6100af	9500af
0500 0600 vl	Australia, ABC/Katherine	5025do				0500 0600	Turkey, Voice of	6010va	7240as	21715as
0500 0600 vl	Australia, ABC/Tennant Creek	4910do				0500 0600	Uganda, Radio	4976do		
0500 0600	Australia, Radio	9660as	12080as	15240as		0500 0600	UK, BBC World Service	3255af	3955eu	5975na 6005af
		15515as	17580as	21725as				6175am	6190af	6195eu 7160af
		15415as	17750as					9410eu	9740as	11760me 11765af
0500 0600 as	Australia, Radio	11980am						11955pa	12095eu	15310as 15360as
0500 0530	Belgium, R Vlaanderen Intl	4820do	7255do					15420af	15575as	17640af 17760as
0500 0600 vl	Botswana, Radio	9625do						17790as	17885af	21660as
0500 0600	Canada, CBC N Quebec Svc	6070do				0500 0600	Ukraine, Radio Ukraine Intl	4820eu	6020va	6030na 6080eu
0500 0600	Canada, CFRX Toronto	6030do						7205eu	7420eu	9600eu 9610eu
0500 0600	Canada, CFPV Calgary	6130do						9785va	9810va	
0500 0600	Canada, CHNX Halifax	6160do						4278am	6458am	12689am
0500 0600	Canada, CKZN St John's	6160do						5835va		
0500 0600	Canada, CKZU Vancouver	9560na				0500 0600	USA, Armed Forces Network	7510na		
0500 0556	China, China Radio Intl	6975va	15050va			0500 0600	USA, KAU Dallas TX	9975am		
0500 0600	Costa Rica, RF Peace Intl	9550na	9820na	9830na		0500 0600 vl	USA, KVOH Los Angeles CA	17780as		
0500 0600	Cuba, Radio Havana	9745na	12015na	21455va		0500 0600	USA, KWHR Naalehu HI	5970af	6035af	6080af 7170af
0500 0600	Ecuador, HCBJ	6100na	6120na	9670na		0500 0600	USA, Voice of America	7295af	9700af	9775af 11825eu
0500 0545	Germany, Deutsche Welle	11795na						12080af	15205as	
		6110na	7230eu	9835eu		0500 0600	USA, WBCQ Monticello ME	7415na		
0500 0600	Japan, Radio/NHK	11715as	11760as	11840as		0500 0600	USA, WEWN Birmingham AL	5825na		
		11850pa	15230pa	15590as		0500 0600	USA, WGTG McCaysville GA	5085va	6890am	
		4885do	4935do			0500 0600	USA, WHRA Greenbush ME	7435af		
0500 0600	Kenya, Kenya BC Corp	15110as				0500 0600	USA, WHRI Noblesville IN	5745na	7315sa	
0500 0600	Kuwait, Radio	4800do				0500 0600	USA, WINB Red Lion PA	11950am		
0500 0600 vl	Lesotho, Radio	5100do				0500 0600	USA, WJCR Upton KY	7490na	13595na	
0500 0600	Liberia, LCN/R Liberia Int	3380do	5995do			0500 0600	USA, WRMI/R Miami Intl	7385na		
0500 0600 vl	Malawi, MBC	7295do				0500 0600	USA, WRNO New Orleans LA	7395na		
0500 0600	Malaysia, Radio	7160do				0500 0600	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af
0500 0600	Malaysia, RTM Sarawak	6175as	9750as	15295as		0500 0600	USA, WTJC Newport NC	9370na		
0500 0600	Malaysia, Voice of	9705am				0500 0505	USA, WWCR Nashville TN	2390na	5070na	5935na
0500 0530 stwhfa	Mexico, Radio Mexico Intl	6165na	9590na			0500 0505 as	USA, WWCR Nashville TN	3210na		
0500 0525	Netherlands, Radio	17675va				0500 0505 mtwhf	USA, WWCR Nashville TN	3215na		
0500 0600	New Zealand, R NZ Intl	6025do				0500 0600	USA, WYFR Okeechobee FL	5985na	9355na	11550va
0500 0600 vl	Nigeria, Radio/Enugu	6050do				0500 0530	Vatican City, Vatican R	9660af	11625af	15570af
0500 0600 vl	Nigeria, Radio/Ibadan	4770do	6090do	7275do		0500 0600	Zambia, Christian Voice	6065do		
0500 0600 vl	Nigeria, Radio/Kaduna	9570do				0500 0530	Zambia, ZBC Radio 4	4848do		
0500 0600 vl	Nigeria, Radio/Lagos	3326do	4990do			0500 0530 vl	Zimbabwe, Zimbabwe BC	3396do		
0500 0600	Nigeria, Voice of	7255af	15120va			0505 0510	Croatia, Croatian Radio	7285na		
0500 0504	Pakistan, Radio	11725me	15175me	17555me		0505 0600	USA, WWCR Nashville TN	2390na	3210na	5070na 5935na
0500 0600 vl	Papua New Guinea, NBC	9675do				0515 0555 vl	Honduras, HRMI	5890am		
0500 0600	Russia, Voice of Russia WS	7125na	7180na	12010na		0520 0600 vl	Ghana, Ghana BC Corp	3366do	4915do	
		12020na	15470na	15595na		0530 0600	Austria, Radio Austria Intl	6015na	6155va	13730na 15410eu
		17595na	17660na					17870va		
0500 0530	S Africa, AWR Africa	5960af	6010af			0530 0600	Kiribati, Radio	9810do		
0500 0600	S Africa, Channel Africa	15215af				0530 0600	Thailand, Radio	9655eu	11905eu	15115eu
0500 0600	Singapore, Radio Corp Singapore	6150do				0530 0600	UAE, Radio Dubai	15435au	17830au	21605au
0500 0600 vl	Solomon Islands, SIBC	5020do						21700au		
0500 0600	Spain, R Exterior Espana	6055na				0530 0600 vl	Zimbabwe, Zimbabwe BC	5975do		

SELECTED PROGRAMS

Sundays

0500	Australia, Radio: RA News. See S 0000.
0500	Germany, Deutsche Welle: News. See S 0100.
0500	S Africa, Channel Africa: News. See S 0300.
0500	USA, WRMI/R Miami Intl, FL: Radio Prague.
0505	Australia, Radio: Pacific Review. Focus on the people and issues of the region.
0505	S Africa, Channel Africa: Network Africa. News about Africa, sporting news, financial reports and music.
0506	Germany, Deutsche Welle: Saturday Review. See S 0106.
0515	Germany, Deutsche Welle: Marks and Markets. Germany's role in world trade.
0530	Australia, Radio: In Conversation. A guest interview program.
0530	USA, WRMI/R Miami Intl, FL: The Living Word.
0545	Germany, Deutsche Welle: Living in Germany. See S 0145.
0545	USA, WRMI/R Miami Intl, FL: Viva Miami!

Mondays

0500	Australia, Radio: RA News. See S 0000.
0500	Germany, Deutsche Welle: News. See S 0100.
0500	S Africa, Channel Africa: News. See S 0300.
0500	USA, WRMI/R Miami Intl, FL: Radio Prague.
0505	S Africa, Channel Africa: Dateline Africa. See M 0505.
0506	Germany, Deutsche Welle: Mailbag North America (4/5). Listener mail from the Americas is answered.
0506	Germany, Deutsche Welle: Religion and Society. See S 1106.
0510	Australia, Radio: Pacific Beat. The magazine that provides a focus on the people and issues of the region.
0515	Germany, Deutsche Welle: Cool. See S 1115.

0530	Australia, Radio: Sport. Five or ten minutes of sports news.
0530	USA, WRMI/R Miami Intl, FL: Abundant Life Broadcast.
0540	Australia, Radio: Pacific Beat. See M 0510.
0545	USA, WRMI/R Miami Intl, FL: Upward Look.

Tuesday-Saturday

0500	Australia, Radio: RA News. See S 0000.
0500	Germany, Deutsche Welle: News. See S 0100.
0500	S Africa, Channel Africa: News. See S 0300.
0500	USA, WRMI/R Miami Intl, FL: Radio Prague.
0506	Germany, Deutsche Welle: NewsLink. See M 1106.

Tuesdays

0505	S Africa, Channel Africa: Dateline Africa. See M 0505.
0510	Australia, Radio: Pacific Beat. See M 0510.
0530	Australia, Radio: Sport. See M 0530.
0530	Germany, Deutsche Welle: Man and Environment. See S 1245.
0530	USA, WRMI/R Miami Intl, FL: Voice of Shiloh.
0540	Australia, Radio: Pacific Beat. See M 0510.
0545	Germany, Deutsche Welle: The History of Germany. See S 1645.
0545	USA, WRMI/R Miami Intl, FL: Gospel Across the World.

Wednesdays

0505	S Africa, Channel Africa: Dateline Africa. See M 0505.
0510	Australia, Radio: Pacific Beat. See M 0510.
0530	Australia, Radio: Sport. See M 0530.
0530	Germany, Deutsche Welle: Insight. See W 0130.
0530	USA, WRMI/R Miami Intl, FL: The Carter Report.

0540	Australia, Radio: Pacific Beat. See M 0510.
0545	Germany, Deutsche Welle: German by Radio. See W 0145.

Thursdays

0505	S Africa, Channel Africa: Dateline Africa. See M 0505.
0510	Australia, Radio: Pacific Beat. See M 0510.
0530	Australia, Radio: Sport. See M 0530.
0530	Germany, Deutsche Welle: Living in Germany. See S 0145.
0530	USA, WRMI/R Miami Intl, FL: Jack Van Impe Presents.
0540	Australia, Radio: Pacific Beat. See M 0510.
0545	Germany, Deutsche Welle: Man and Environment. See S 1245.

Fridays

0505	S Africa, Channel Africa: Dateline Africa. See M 0505.
0510	Australia, Radio: Pacific Beat. See M 0510.
0530	Australia, Radio: Sport. See M 0530.
0530	Germany, Deutsche Welle: Spotlight on Sport. See F 0130.
0540	Australia, Radio: Pacific Beat. See M 0510.
0545	Germany, Deutsche Welle: Insight. See W 0130.
0545	USA, WRMI/R Miami Intl, FL: Unveiled Christ to the World.

Saturdays

0505	Australia, Radio: Pacific Focus. See S 0605.
0530	Australia, Radio: In the Pipeline. See S 0030.
0530	Germany, Deutsche Welle: German by Radio. See W 0145.
0530	USA, WRMI/R Miami Intl, FL: Harvest Time.
0545	Germany, Deutsche Welle: Development Forum Asia. See S 1230.
0545	USA, WRMI/R Miami Intl, FL: Viva Miami!

FREQUENCIES

0600 0700	Anguilla, Caribbean Beacon	6090am		
0600 0700 vl	Australia, ABC/Katherine	5025do		
0600 0700 vl	Australia, ABC/Tennant Creek	4910do		
0600 0700	Australia, Radio	9660as	12080as	15240as
		15415as	15515as	17580as
		17750as	21725as	
0600 0700 vl	Botswana, Radio	4820do	4830do	7255do
0600 0700 vl	Canada, CBC N Quebec Svc	9625do		
0600 0700	Canada, CFRX Toronto	6070do		
0600 0700	Canada, CFVP Calgary	6030do		
0600 0700	Canada, CHNX Halifax	6130do		
0600 0700	Canada, CKZN St John's	6160do		
0600 0700	Canada, CKZU Vancouver	6160do		
0600 0629	Canada, Radio Canada Intl	5960na	6045va	6150eu
		9670na	9780af	11905af
		11710af	15325af	
0600 0629 mtwhf	Canada, Radio Canada Intl	6975va		
0600 0700	Costa Rica, RF Peace Intl	7285na		
0600 0605	Croatia, Croatian Radio	7285na		
0600 0700	Cuba, Radio Havana	9550na	9820na	9830na
0600 0700	Ecuador, HCJB	9745na	12015na	21455va
0600 0645	Germany, Deutsche Welle	7225af	9565af	11785af
0600 0700	Germany, Overcomer Ministries	13810au		
0600 0700 vl	Ghana, Ghana BC Corp	3366do	4915do	
0600 0615	Israel, Kol Israel	7475va	9435va	11605va
		17715au		
		3985va		
0600 0700 vl	Italy, IRRS	5975eu	7230eu	9835na
0600 0700	Japan, Radio/NHK	11740as	11840as	11850pa
		4885do	4935do	
0600 0700	Kenya, Kenya BC Corp	9810do		
0600 0700	Kiribati, Radio	15110as		
0600 0700	Kuwait, Radio	4800do		
0600 0700 vl	Lesotho, Radio	5100do		
0600 0700	Liberia, LCN/R Liberia Int	3380do	5993do	
0600 0700 vl	Malawi, MBC	7295do		
0600 0700	Malaysia, Radio	7160do		
0600 0700	Malaysia, RTM Sarawak	6175as	9750as	15295as
0600 0630 twhfa	Malaysia, Voice of	9705am		
0600 0700	Mexico, Radio Mexico Intl	7165af		
0600 0605	Namibia, NBC	17675va		
0600 0700 vl	New Zealand, R NZ Intl	6025do		
0600 0700 vl	Nigeria, Radio/Enugu	6050do		
0600 0700 vl	Nigeria, Radio/Ibadan	4770do	6090do	7275do
0600 0700 vl	Nigeria, Radio/Kaduna	9570do		
		3326do	4990do	
0600 0700 vl	Nigeria, Radio/Lagos	7255af	15120va	
0600 0700	Nigeria, Voice of	9675do		
0600 0700 vl	Papua New Guinea, NBC	9530na	11830na	
0600 0700	Romania, R Romania Intl	7125na	7180na	7570as
0600 0700	Russia, Voice of Russia WS	12010na	12020na	15470na

0600 0630	S Africa, Channel Africa	15595na	17595na	17660na
0600 0700	Sierra Leone, SLBS	15215af		
0600 0700	Singapore, Radio Corp Singapore	3316do		
0600 0700 vl	Solomon Islands, SIBC	6150do		
0600 0700	Swaziland, Trans World R	5020do		
0600 0630	Switzerland, Swiss R Intl	4775af	6100af	9500af
0600 0700	UK, BBC World Service	9655eu		
		3955eu	6005af	6175am
		6195eu	7160af	9410eu
		9580pa	9740as	11760me
		11765af	11940af	11955pa
		12095eu	15310as	15360as
		15420af	15575as	17640af
		17760as	17790as	17885af
		21660as		
0600 0700	USA, Armed Forces Network	4278am	6458am	12689am
0600 0700	USA, KAIJ Dallas TX	5835va		
0600 0700	USA, KTN Salt Lake City UT	7510na		
0600 0700	USA, KWHR Naalehu HI	17780as		
0600 0700	USA, Voice of America	5970af	5995af	6035af
		7170af	7295af	6080af
		11825af	11930af	12080af
		15205as	15600af	
0600 0700	USA, WBCQ Monticello ME	7415na		
0600 0700	USA, WEWN Birmingham AL	5825na		
0600 0700	USA, WGTG McCaysville GA	5085va	6890va	
0600 0700	USA, WHRA Greenbush ME	7435af		
0600 0700	USA, WHRI Noblesville IN	5745na	7315sa	
0600 0700	USA, WJCR Upton KY	7490na	13595na	
0600 0700	USA, WRMI/R Miami Intl	7385na		
0600 0700	USA, WRNO New Orleans LA	7395na		
0600 0700	USA, WSHB Cypress Crk SC	7535af		
0600 0700	USA, WTJC Newport NC	9370na		
0600 0700	USA, WWCR Nashville TN	2390na	3210na	5070na
		5935na		
0600 0700	USA, WYFR Okeechobee FL	5985na	7355eu	
0600 0700 vl	Vanuatu, Radio	4960do		
0600 0700	Yemen, Rep of Yemen Radio	9780me		
0600 0700	Zambia, Christian Voice	9865do		
0600 0610	Zambia, ZBC Radio 4	5975do		
0600 0700 vl	Zimbabwe, Zimbabwe BC	5975do		
0610 0615 mtwhf	Greece, Voice of	7475eu	11645au	15630eu
0630 0700	Austria, Radio Austria Intl	6015na		
0630 0700 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do	
0630 0700 as	USA, Voice of America	5970af	6035af	6080af
		11805af	12080af	15600af
		11625af	13765af	15570af
0641 0656	Vatican City, Vatican R	7105eu	9510eu	11775eu
	Romania, R Romania Intl	15105eu		
0645 0700	Germany, Deutsche Welle	6140eu		

SELECTED PROGRAMS

Sundays

0600	Australia, Radio: RA News. See S 0000.
0600	Germany, Deutsche Welle: News. See S 0100.
0600	S Africa, Channel Africa: Network Africa. See S 0505.
0600	USA, WRMI/R Miami Intl, FL: Scream of the Butterfly. John Wisnianski with a mix of interesting album tracks and singles from the late 60s and early 70s.
0605	Australia, Radio: Pacific Focus. Coverage of issues of relevance to people of the Pacific region.
0606	Germany, Deutsche Welle: Saturday Review. See S 0106.
0615	Germany, Deutsche Welle: Inside Europe. See S 0115.
0630	Australia, Radio: Correspondents' Report. See S 0010.
0645	Germany, Deutsche Welle: Living in Germany. See S 0145.

Monday-Friday

0600	Australia, Radio: RA News. See S 0000.
0600	Germany, Deutsche Welle: News. See S 0100.
0600	S Africa, Channel Africa: News. See S 0300.
0600	USA, WRMI/R Miami Intl, FL: Herald of Truth.
0605	S Africa, Channel Africa: Dateline Africa. See M 0505.
0615	USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.

Mondays

0606	Germany, Deutsche Welle: Sunday Review. See S 2306.
0610	Australia, Radio: The Australian Music Show. Kim Taylor presents the music, people, and issues of the Australian contemporary music industry.

0615	Germany, Deutsche Welle: Marks and Markets. See S 0515.
0630	Australia, Radio: Sports. A half-hour of sports.

Tuesdays

0608	Germany, Deutsche Welle: NewsLink. See M 1106.
0610	Australia, Radio: Presenter's Choice. Music mix.
0630	Australia, Radio: Sports. See M 0630.
0630	Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0645	Germany, Deutsche Welle: The History of Germany. See S 1645.

Wednesdays

0608	Germany, Deutsche Welle: NewsLink. See M 1106.
0610	Australia, Radio: Blacktracker. Mal Honess with an insight into the music and performance of Australia's aborigines.
0630	Australia, Radio: Sports. See M 0630.
0630	Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0645	Germany, Deutsche Welle: German by Radio. See W 0145.

Thursdays

0608	Germany, Deutsche Welle: NewsLink. See M 1106.
0610	Australia, Radio: Australian Country Style. John Nutting goes up country.
0630	Australia, Radio: Sports. See M 0630.
0630	Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0645	Germany, Deutsche Welle: Man and Environment. See S 1245.

Fridays

0608	Germany, Deutsche Welle: NewsLink. See M 1106.
0610	Australia, Radio: Music Deli. See M 1605.
0630	Australia, Radio: Sports. See M 0630.
0630	Germany, Deutsche Welle: Good Morning Africa. See T 0430.
0645	Germany, Deutsche Welle: Insight. See W 0130.

Saturdays

0600	Australia, Radio: RA News. See S 0000.
0600	Germany, Deutsche Welle: News. See S 0100.
0600	S Africa, Channel Africa: News. See S 0300.
0600	USA, WRMI/R Miami Intl, FL: The Overcomer Broadcast.
0605	Australia, Radio: Feedback. See S 0330.
0608	Germany, Deutsche Welle: NewsLink. See M 1106.
0630	Australia, Radio: Arts Talk. See W 2330.
0630	Germany, Deutsche Welle: German by Radio. See W 0145.
0645	Germany, Deutsche Welle: Development Forum Asia. See S 1230.

Hauser's Highlights

ARMENIA: V. of Armenia

New English language schedule:
 0940-1000 Sunday 5270
 2055-2115 Mon-Sat 4810, 9965
 (Edwin Southwell, England, Jan 2, *DX Listening Digest*)
 May be one UT hour earlier for summer

FREQUENCIES

0700	0800		Anguilla, Caribbean Beacon	6090am					0800	0900		Albania, Trans World R	9870eu	12070eu	
0700	0800	vl	Australia, ABC/Katherine	5025do					0800	0900		Anguilla, Caribbean Beacon	6090am		
0700	0800	vl	Australia, ABC/Tennant Creek	4910do					0800	0830	vl	Australia, ABC/Katherine	5025do		
0700	0800		Australia, Radio	9660as	12080as	15240as	15415as		0800	0830	vl	Australia, ABC/Tennant Creek	4910do		
				15515as	17580as	17750as	21725as		0800	0830		Australia, Radio	5995as	9710as	12080as 13605as
0700	0800	vl	Botswana, Radio	4820do									15515as	21725as	
0700	0800		Canada, CFRX Toronto	6070do					0800	0830	as	Australia, Radio	15415as	17750as	
0700	0800		Canada, CFVP Calgary	6030do					0800	0900	vl	Botswana, Radio	4820do	4830do	7255do
0700	0800		Canada, CHNX Halifax	6130do					0800	0900	vl	Canada, CBC N Quebec Svc	9625do		
0700	0800		Canada, CKZN St John's	6160do					0800	0900		Canada, CFRX Toronto	6070do		
0700	0800		Canada, CKZU Vancouver	6160do					0800	0900		Canada, CFVP Calgary	6030do		
0700	0800		Costa Rica, RF Peace Intl	6975va					0800	0900		Canada, CHNX Halifax	6130do		
0700	0800		Ecuador, HCJB	9780eu	11755pa	21455va			0800	0900		Canada, CKZN St John's	6160do		
0700	0800		Eqt Guinea, Radio Africa	15186af					0800	0900		Canada, CKZU Vancouver	6160do		
0700	0800		Germany, Deutsche Welle	6140eu					0800	0900		Costa Rica, RF Peace Intl	6975va		
0700	0800	s	Germany, Good News World R	13740au					0800	0827		Czech Rep, R Prague Intl	11600eu	15255eu	
0700	0800		Germany, Voice of Hope	5975eu					0800	0900		Ecuador, HCJB	9780eu	11755pa	21455va
0700	0715	vl	Ghana, Ghana BC Corp	3366do	4915do				0800	0900		Eqt Guinea, Radio Africa	15186af		
0700	0800	vl	Italy, IRRS	7120va					0800	0900		Germany, Deutsche Welle	6140eu		
0700	0800		Kenya, Kenya BC Corp	4885do	4935do				0800	0900		Germany, Overcomer Ministries	13810au		
0700	0800		Kiribati, Radio	9810do					0800	0900		Germany, Voice of Hope	5975eu		
0700	0800		Kuwait, Radio	15110as					0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800	vl	Lesotho, Radio	4800do					0800	0900	as	Guam, TWR/KTWR	15200as		
0700	0715		Liberia, LCN/R Liberia Int	5100do					0800	0900		Guam, TWR/KTWR	15300au		
0700	0800	vl	Malawi, MBC	3380do	5995do				0800	0900		Indonesia, Voice of	9525va		
0700	0800		Malaysia, Radio	7295do					0800	0815	vl	Italy, IRRS	7120va		
0700	0800		Malaysia, RTM Sarawak	7160do					0800	0900		Kenya, Kenya BC Corp	4885do	4935do	
0700	0800		Malaysia, Voice of	6175as	9750as	15295as			0800	0900		Kiribati, Radio	9810do		
0700	0800		New Zealand, R NZ Intl	17690va					0800	0900	vl	Lesotho, Radio	4800do		
0700	0800	vl	Nigeria, Radio/Enugu	6025do					0800	0900		Liberia, LCN/R Liberia Int	5100do		
0700	0800	vl	Nigeria, Radio/Ibadan	6050do					0800	0810	vl	Malawi, MBC	3380do	5995do	
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		0800	0900		Malaysia, Radio	7295do		
0700	0800	vl	Nigeria, Radio/Lagos	3326do	4990do				0800	0900	vl	Malaysia, RTM Kota Kinabalu	5980do		
0700	0800	vl	Nigeria, Voice of	7255af	15120va				0800	0825		Malaysia, Voice of	6175as	9750as	15295as
0700	0800		Palau, KHBN/Voice of Hope	9965as	9985as	15725as			0800	0830		Myanmar, Radio	9730do		
0700	0730	vl	Papua New Guinea, NBC	9675do					0800	0900		N Marianas, KFBS Saipan	11650as	15380as	
0700	0800		Romania, R Romania Intl	17720af	21480af				0800	0900		New Zealand, R NZ Intl	17690va		
0700	0800		Russia, Voice of Russia WS	15460au	15470au	15525au	17570au		0800	0900	vl	Nigeria, Radio/Enugu	6025do		
				21790au					0800	0900	vl	Nigeria, Radio/Ibadan	6050do		
0700	0800		Sierra Leone, SLBS	3316do					0800	0900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do 9570do
0700	0800		Singapore, Radio Corp Singapore	6150do					0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do	
0700	0730		Slovakia, R Slovakia Intl	11990au	15460au	21705au			0800	0900		Palau, KHBN/Voice of Hope	9955as	9965as	9985as 15725as
0700	0800	vl	Solomon Islands, SIBC	5020do					0800	0900	vl	Papua New Guinea, NBC	4890do		
0700	0735		Swaziland, Trans World R	4775af	6100af	9500af			0800	0900		Russia, Voice of Russia WS	15460au	15470au	15525au 17495au
0700	0730		Switzerland, Swiss R Intl	9655eu									17570au	21790au	
0700	0800		Taiwan, Radio Taiwan Intl	5950na					0800	0900		Sierra Leone, SLBS	5980do		
0700	0715	as	UK, BBC World Service	17885af					0800	0900		Singapore, Radio Corp Singapore	6150do		
0700	0800		UK, BBC World Service	6005af	6175am	6190af	6195eu		0800	0900		South Korea, R Korea Intl	9570au	13670eu	
				9410eu	9580pa	9740as			0800	0900		UK, BBC World Service	6190af	9410eu	9580pa 9740as
				11760me	11765af	11940af	11955pa						11940af	11955pa	12095eu 15310as
				12095eu	15310as	15400af	15485eu						15360as	15400af	15485eu 15565eu
				15565eu	17640eu	17760as	17790as						17640eu	17760as	17790as 17830af
				17830af	21660as								21660as	21830as	
0700	0800		USA, Armed Forces Network	4278am	6458am	12689am			0800	0900	as	UK, BBC World Service	15575as	17885af	
0700	0800		USA, KAIJ Dallas TX	5835va					0800	0900		USA, Armed Forces Network	4278am	6458am	12689am
0700	0800		USA, KTBN Salt Lake City UT	7510na					0800	0900		USA, KAIJ Dallas TX	5835va		
0700	0800		USA, KWHR Naalehu HI	11565as	17780as				0800	0900		USA, KNLS Anchor Point AK	11780as		
0700	0730	a	USA, Voice of America	6873va					0800	0900		USA, KTBN Salt Lake City UT	7510na		
0700	0800		USA, WBCQ Monticello ME	7415na					0800	0900		USA, KWHR Naalehu HI	11565as	17780as	
0700	0800		USA, WEWN Birmingham AL	5825na					0800	0900		USA, Voice of America	11995as	13650as	15150as
0700	0800		USA, WHRA Greenbush ME	7435af					0800	0900		USA, WBCQ Monticello ME	7415na		
0700	0800		USA, WHRI Noblesville IN	5745na	7315sa				0800	0900		USA, WEWN Birmingham AL	5825na		
0700	0800		USA, WJCR Upton KY	7490na	13595na				0800	0900		USA, WHRA Greenbush ME	7435af		
0700	0800		USA, WRMI/R Miami Intl	7385na					0800	0900		USA, WHRI Noblesville IN	5745na	7315sa	
0700	0800		USA, WRNO New Orleans LA	7395na					0800	0900		USA, WJCR Upton KY	7490na	13595na	
0700	0800		USA, WSHB Cypress Crk SC	7535af					0800	0900	twfha	USA, WRMI/R Miami Intl	7385na		
0700	0800		USA, WTJC Newport NC	9370na					0800	0900		USA, WRNO New Orleans LA	7395na		
0700	0800		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na		0800	0900		USA, WSHB Cypress Crk SC	7535eu	9845pa	
0700	0800		USA, WYFR Okeechobee FL	5850eu	7355eu	9985af			0800	0900		USA, WTJC Newport NC	9370na		
0700	0800	vl	Vanuatu, Radio	4960do					0800	0900		USA, WWCR Nashville TN	2390na	3210na	5070na 5935na
0700	0720		Vatican City, Vatican R	4005eu	5883eu	7250eu			0800	0900	vl	Vanuatu, Radio	4960do		
0700	0800		Zambia, Christian Voice	9865do					0800	0900		Zambia, Christian Voice	9865do		
0700	0800	vl	Zimbabwe, Zimbabwe BC	5975do					0800	0900	vl	Zimbabwe, Zimbabwe BC	5975do		
0705	0710		Croatia, Croatian Radio	11880au	13820al				0804	0820		Pakistan, Radio	15530eu	17835eu	
0715	0800	as	UK, BBC World Service	15575as	17885af				0805	0810		Croatia, Croatian Radio	11880au	13820al	
0725	0800		Myanmar, Radio	9730do					0805	0810	mtwfhfa	Croatia, Croatian Radio	6165eu	7365eu	9830eu
0730	0750	a	Finland, YLE/R Finland	9840va	21670as				0810	0815	s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do	
0730	0800		Finland, YLE/R Finland	9840va	21670as				0815	0900	as/vl	Italy, IRRS	7120va		
0730	0800		Georgia, Georgian Radio	11910eu					0815	0900	f	Seychelles, FEBA Radio	15460as		
0730	0800	as	Guam, TWR/KTWR	15200as					0830	0900	vl	Australia, ABC/Alice Springs	2310do		
0730	0800	mtwfhfa	Malta, V of Mediterranean	7155eu					0830	0900	vl	Australia, ABC/Katherine	2485do		
0730	0800	vl	Papua New Guinea, NBC	4890do					0830	0900	vl	Australia, ABC/Tennant Creek	2325do		
0730	0800		Switzerland, Swiss R Intl	9885va	13635af	17665af			0830	0900		Australia, Radio	5995as	9710as	12080as 13605as
0730	0745	mtwhf	Vatican City, Vatican R	15595af									15415as	15515as	17750as 21725as
0740	0750		Greece, Voice of	7425eu	7475eu	9420na	11645au		0830	0900	a	Austria, Radio Austria Intl	21650as	21765as	
				15630eu					0830	0900	vl	Solomon Islands, SIBC	5020do		
0745	0800	as	Albania, Trans World R	9870eu	12070eu				0830	0900		Switzerland, Swiss R Intl	9885au	13685au	
0750	0800	as	Greece, Voice of	9775au					0830	0845	mtwhf	Vatican City, Vatican R	4005eu	5883eu	6185eu 7250eu
0755	0800	mtwhf	Albania, Trans World R	9870eu	12070eu								9645eu	11740eu	
									0845	0855	as	Monaco, Trans World Radio	9870eu		
									0855	0900	mtwhf	Monaco, Trans World Radio	9870eu		



FREQUENCIES

0900	0920		Albania, Trans World R	9870Eu	12070Eu				1000	1100		Anguilla, Caribbean Beacon	11775am		
0900	1000		Anguilla, Caribbean Beacon	6090am					1000	1100		Australia, ABC/Alice Springs	2310do		
0900	1000	vl	Australia, ABC/Alice Springs	2310do					1000	1100	vl	Australia, ABC/Katherine	2485do		
0900	1000	vl	Australia, ABC/Katherine	2485do					1000	1100	vl	Australia, ABC/Tennant Creek	2325do		
0900	1000	vl	Australia, ABC/Tennant Creek	2325do					1000	1100		Australia, Radio	11880as	13605as	17750as
0900	1000		Australia, Radio	11550as	11880as	13605as							21820as		
				17750as	21820as								6035do		
0900	0930		Belgium, R Vlaanderen Intl	5985am					1000	1100	as	Bhutan, Bhutan BC Service			
0900	1000	vl	Botswana, Radio	4820do	4830do	7255do			1000	1100	vl	Botswana, Radio	4820do	4830do	7255do
0900	1000		Canada, CFRX Toronto	6070do					1000	1100	vl	Canada, CBC N Quebec Svc	9625do		
0900	1000		Canada, CFPV Calgary	6030do					1000	1100		Canada, CFRX Toronto	6070do		
0900	1000		Canada, CHNX Halifax	6130do					1000	1100		Canada, CFPV Calgary	6030do		
0900	1000		Canada, CKZN St John's	6160do					1000	1100		Canada, CHNX Halifax	6130do		
0900	1000		Canada, CKZU Vancouver	6160do					1000	1100		Canada, CKZN St John's	6160do		
0900	0956		China, China Radio Intl	11730pa	15210pa				1000	1056		Canada, CKZU Vancouver	6160do		
0900	1000		Costa Rica, RF Peace Intl	6975va					1000	1100		China, China Radio Intl	11730pa	15210pa	
0900	1000		Ecuador, HCJB	11775pa	21455va				1000	1010		Costa Rica, RF Peace Intl	6975va		
0900	1000		Eqt Guinea, Radio Africa	15186af					1000	1029		Croatia, Croatian Radio	13820au		
0900	0945		Germany, Deutsche Welle	6160pa	11785af	12055as			1000	1100		Czech Rep, R Prague Intl	17485af	21745va	
				15105as	15410af	17800af			1000	1100		Ecuador, HCJB	11755pa	21455va	
				17820as	17860af	21600af			1000	1100		Eqt Guinea, Radio Africa	15186af		
				5995Eu					1000	1100		Germany, Deutsche Welle	6140Eu		
0900	1000	a	Germany, Good News World R	13800va					1000	1100		Germany, Voice of Hope	5975Eu		
0900	1000	s	Germany, Good News World R	5975Eu								India, All India Radio	11585as	13700as	15020as
0900	1000		Germany, Voice of Hope	4915do	6130do								17840as	17845au	17895au
0900	0915		Ghana, Ghana BC Corp	15200as					1000	1100	as/vl	Italy, IRRS	7120va		
0900	0915	as	Guam, TWR/KTWR	15300au					1000	1100		Japan, Radio/NHK	9695as	11850pa	15590as
0900	1000	as/vl	Italy, IRRS	7120va					1000	1100	vl	Kenya, Kenya BC Corp	4935do		
0900	1000		Kenya, Kenya BC Corp	4935do					1000	1100		Lesotho, Radio	4800do		
0900	0930	vl	Kiribati, Radio	9810do					1000	1100	vl	Malaysia, Radio	7295do		
0900	1000	vl	Lesotho, Radio	4800do					1000	1100	s	Malaysia, RTM Kota Kinabalu	5980do		
0900	0915		Liberia, LCN/R Liberia Int	5100do					1000	1020	mtwhf	Malta, V of Mediterranean	11770Eu		
0900	1000	vl	Malaysia, Radio	7295do					1000	1100		Monaco, Trans World Radio	9870Eu		
0900	1000	mtwhf	Malaysia, RTM Kota Kinabalu	5980do					1000	1100		N Marianas, KFBS Saipan	9495as	11650as	15380as
0900	1000		Monaco, Trans World Radio	9870Eu					1000	1100		N Marianas, KHBI Saipan	11840as		
0900	1000		N Marianas, KFBS Saipan	9495as	11650as	15380as			1000	1100		Netherlands, Radio	7260as	9790as	12065as
0900	1000		N Marianas, KHBI Saipan	11725as					1000	1100	vl	New Zealand, R NZ Intl	17690va		
0900	1000		New Zealand, R NZ Intl	17690va					1000	1100	vl	Nigeria, Radio/Enugu	6025do		
0900	1000	vl	Nigeria, Radio/Enugu	6025do					1000	1100	vl	Nigeria, Radio/Ibadan	6050do		
0900	1000	vl	Nigeria, Radio/Ibadan	6050do					1000	1100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do
0900	1000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		1000	1100	vl	Nigeria, Radio/Lagos	4990do	7285do	
0900	1000	vl	Nigeria, Radio/Lagos	3326do	4990do				1000	1100	vl	Nigeria, Voice of	7255af	15120va	
0900	1000		Palau, KHBN/Voice of Hope	9955as	9965as	9985as			1000	1100		Palau, KHBN/Voice of Hope	9955as	9965as	9985as
				15725as									15725as		
0900	1000	vl	Papua New Guinea, NBC	4890do					1000	1100	vl	Papua New Guinea, NBC	4890do		
0900	1000		Russia, Voice of Russia WS	9905au	15460au	15470au			1000	1100		Russia, Voice of Russia WS	9905au	15460au	15470au
				17495au	21740au								17495au		
0900	1000		Sierra Leone, SLBS	5980do					1000	1100		Sierra Leone, SLBS	5980do		
0900	1000	vl	Singapore, Radio Corp Singapore	6150do					1000	1100		Singapore, Radio Corp Singapore	6150do		
0900	1000		Solomon Islands, SIBC	5020do					1000	1030		Singapore, RTE Radio	11740as		
0900	1000		Tanzania, Radio	5050af					1000	1100	vl	Solomon Islands, SIBC	5020do		
0900	1000		UK, BBC World Service	6190af	6195va	7245as	9740as		1000	1030		Tanzania, Radio	5050af		
				11760me	11765as	11940af			1000	1100		UK, BBC World Service	6190af	6195va	9740as
				11945as	11955pa	12095Eu							11760me	11940af	11955pa
				15190as	15310as	15360as	15400af						12095Eu	15310as	15360as
				15485Eu	15565Eu	15575as							15485Eu	15565Eu	15575as
				17640Eu	17760as	17790as	17830af						17640Eu	17760as	17790as
				17885af	21470af	21660as							17885af	21470af	21660as
0900	1000		USA, Armed Forces Network	4278am	6458am	12689am			1000	1100	as	UK, BBC World Service	15190as	15400af	17830af
0900	1000		USA, KAIJ Dallas TX	5835va					1000	1100		USA, Armed Forces Network	4278am	6458am	12689am
0900	1000		USA, KTBN Salt Lake City UT	7510na					1000	1100		USA, KAIJ Dallas TX	5835va		
0900	1000		USA, KWHR Naalehu HI	11565as	17780as				1000	1100		USA, KTBN Salt Lake City UT	7510na		
0900	1000		USA, Voice of America	11995as	13650as	15150as			1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
0900	1000		USA, WBCQ Monticello ME	7415na					1000	1100		USA, Voice of America	5985pa	6165am	7370am
0900	1000		USA, WEWN Birmingham AL	5825na									9590am	11720as	15250as
0900	1000		USA, WHRA Greenbush ME	7435af									15425as		
0900	1000		USA, WHRI Noblesville IN	5745na	7315na				1000	1100		USA, WBCQ Monticello ME	7415na		
0900	1000		USA, WJCR Upton KY	7490na	13595na				1000	1100		USA, WEWN Birmingham AL	5825na	7465Eu	
0900	1000	twhf	USA, WRMI/R Miami Intl	7385na					1000	1100		USA, WHRI Noblesville IN	6040na	9495am	
0900	1000		USA, WRNO New Orleans LA	7395na					1000	1100		USA, WJCR Upton KY	7490na	13595na	
0900	1000		USA, WSHB Cypress Crk SC	7535Eu	9455sa	11725as			1000	1100	mtwh	USA, WRMI/R Miami Intl	7385na		
0900	1000		USA, WTJC Newport NC	9370na					1000	1100		USA, WRNO New Orleans LA	7395na		
0900	1000		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na		1000	1100		USA, WSHB Cypress Crk SC	6095am	9455sa	
0900	1000		Zambia, Christian Voice	9865do					1000	1100		USA, WTJC Newport NC	9370na		
0900	1000	vl	Zimbabwe, Zimbabwe BC	5975do					1000	1100		USA, WWCR Nashville TN	2390na	3210na	5070na
0905	0910		Croatia, Croatian Radio	13820au									5935na		
0905	0910	s	Croatia, Croatian Radio	6165Eu	7185Eu	7365Eu	9830Eu		1000	1100		USA, WYFR Okeechobee FL	5950na		
0920	0950	s	Albania, Trans World R	9870Eu	12070Eu				1000	1027		Vietnam, Voice of	9840as	12020as	
0920	0950	as	UK, BBC World Service	6195as	9740as	11955pa			1000	1100		Zambia, Christian Voice	9865do		
				15360as	17760as	21660as			1000	1100	vl	Zimbabwe, Zimbabwe BC	5975do		
0930	1000		Austria, Radio Austria Intl	21650as	21765au				1006	1058		Australia, Defense Forces Radio	11140as		
0930	1000		Georgia, Georgian Radio	11910Eu					1020	1030	t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do	
0930	1000		Italy, AWR Europe	7230Eu					1020	1050	s	Monaco, Trans World Radio	9870do		
0930	1000		Netherlands, Radio	7260as	9790as	12065as			1030	1100	mtwhf	Ethiopia, Radio	5990do	7110do	9705do
0940	1000	s	Armenia, Voice of	15240Eu					1030	1100		Georgia, Georgian Radio	11910me		
0945	1000		Germany, Deutsche Welle	6140Eu					1030	1100		Guam, AWR/KSDA	11660as	11795as	
0953	1000		Australia, Defense Forces Radio	11140as					1030	1100		Lithuania, Radio Vilnius	9710Eu		
									1030	1100		Malaysia, RTM Sarawak	7160do		
									1030	1100	as	Tanzania, Radio	5050af		
									1030	1100		UAE, Radio Dubai	13675Eu	15370Eu	15395Eu
													21605Eu		

1100	1200		Anguilla, Caribbean Beacon	11775am					1100	1200		Switzerland, Swiss R Intl	9540as	21770as	
1100	1200	vl	Australia, ABC/Alice Springs	2310do					1100	1200		Taiwan, Voice of Asia	7445as		
1100	1200	vl	Australia, ABC/Katherine	2485do					1100	1200	as	Tanzania, Radio	5050af		
1100	1200	vl	Australia, ABC/Tennant Creek	2325do					1100	1130	mtwhf	UK, BBC Caribbean Report	6195am	15220am	
1100	1200		Australia, Radio	5995as	6020as	9580as	12080as		1100	1130	as	UK, BBC World Service	6195na	15190as	15220am
				13605as	21820as				1100	1200		UK, BBC World Service	5965na	6190af	6195as 9580as
1100	1200	vl	Botswana, Radio	4820do	4830do	7255do							9740as	11760me	11940af 11955as
1100	1200		Canada, CFRX Toronto	6070do									12095eu	15280as	15310as 15400af
1100	1200		Canada, CFVP Calgary	6030do									15485eu	15565eu	15575as 17640eu
1100	1200		Canada, CHNX Halifax	6130do									17705as	17790sa	17830af 17885af
1100	1200		Canada, CKZN St John's	6160do									21470af		
1100	1200		Canada, CKZU Vancouver	6160do					1100	1200		USA, Ar mee Forces Network	4278am	6458am	12689am
1100	1200		Costa Rica, RF Peace Intl	6975va					1100	1200		USA, KAIJ Dallas TX	5835va		
1100	1200		Ecuador, HCJB	12005am	15115am	21455va			1100	1200		USA, KLTN Salt Lake City UT	7510na		
1100	1200		Egt Guinea, Radio Africa	15186af					1100	1200		USA, KWHR Naelehu HI	9930as	11565as	
1100	1145		Germany, Deutsche Welle	6140eu	15410af	17800af	21780af		1100	1130	mtwhf	USA, Voice of America	13675af	15510af	17650af 17750af
1100	1200		Germany, Overcomer Ministries	5850eu									21705af		
1100	1200	as	Ghana, Ghana BC Corp	4915do	6130do				1100	1200		USA, Voice of America	5985pa	6110as	9645as 9760as
1100	1200		Iran, VOIRI	13710as	15255pa	15430me	17565as					11705as	11720as	15250as 15425as	
				21470as	21510as				1100	1200		USA, WEWN Birmingham AL	5825na	15745eu	
1100	1200	as/vl	Italy, IRRS	7120va					1100	1200		USA, WHRI Noblesville IN	6040na	9495am	
1100	1200		Japan, Radio/NHK	6120na	9695as	15590as			1100	1200		USA, WJCR Upton KY	7490na	13595na	
1100	1200		Kenya, Kenya BC Corp	4935do					1100	1200		USA, WRNO New Orleans LA	7395na		
1100	1200	vl	Lesotho, Radio	4800do					1100	1200		USA, WSHB Cypress Crk SC	6095am	11660sa	
1100	1110		Liberia, LCN/R Liberia Int	5100do					1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		Malaysia, Radio	7295do					1100	1200		USA, WWCR Nashville TN	2390na	5070na	5935na 12160na
1100	1200	vl	Malaysia, RTM Kota Kinabalu	5980do					1100	1200		USA, WYFR Okeechobee FL	5950na	7355na	11830na
1100	1200		N Marianas, KFBS Saipan	9495as	11650as	15380as			1100	1127		Vietnam, Voice of	7285as		
1100	1125		Netherlands, Radio	7260as	9790as	12065as			1100	1200		Zambia, Christian Voice	9865do		
1100	1200	occsnol	New Zealand, R NZ Intl	6105va					1100	1200	vl	Zimbabwe, Zimbabwe BC	5975do		
1100	1200		New Zealand, R NZ Intl	17690va					1104	1120		Pakistan, Radio	15530eu	17835eu	
1100	1200	vl	Nigeria, Radio/Enugu	6025do					1115	1145		Nepal, Radio	3230as	5005as	
1100	1200	vl	Nigeria, Radio/Ibadan	6050do					1130	1200	vl	China, China Radio Intl	8660as	11700as	
110															

1300	1400		Anguilla, Caribbean Beacon	11775am						1300	1400		Sierra Leone, SLBS	5980do					
1300	1400	vl	Australia, ABC/Alice Springs	2310do						1300	1400		Singapore, R Singapore Int	6150as	9590as				
1300	1400	vl	Australia, ABC/Katherine	2485do						1300	1400		South Korea, R Korea Intl	9570as	9640om	13670as			
1300	1400	vl	Australia, ABC/Tennant Creek	2325do						1300	1400		Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as		
1300	1400		Australia, Radio	5995as	6020as	9445as	9580as							15425as					
				11650as	11660as	21820as				1300	1400	as	Tanzania, Radio	5050af					
1300	1400	vl	Botswana, Radio	4820do	4830do	7255do				1300	1400		Uganda, Radio	4976do					
1300	1320		Brazil, Radio Nacional Bras	15445am						1300	1400		UK, BBC World Service	5965na	5990as	6190af	6195va		
1300	1400		Bulgaria, Radio	15700eu	17500eu									9515na	9590na	9740as	11760me		
1300	1400	vl	Canada, CBC N Quebec Svc	9625do										11940af	12095eu	15220am	15310as		
1300	1400		Canada, CFRX Toronto	6070do										15420af	15485eu	15565eu	15575as		
1300	1400		Canada, CFVP Calgary	6030do										17640eu	17705as	17830af	17885af		
1300	1400		Canada, CHNX Halifax	6130do										21470af					
1300	1400		Canada, CKZN St John's	6160do						1300	1400		Ukraine, Radio Ukraine Intl	9870na	15520na	21510na			
1300	1400		Canada, CKZU Vancouver	6160do						1300	1400		USA, Armed Forces Network	4278am	6458am	12689am			
1300	1330		Canada, Radio Canada Intl	9640na	13650na	17710na				1300	1400		USA, KAIJ Dallas TX	5835va					
1300	1356		China, China Radio Intl	9570na	11675pa	11900pa	11980as			1300	1400		USA, KJES Vado NM	11715na					
				15180as						1300	1400		USA, KNLS Anchor Point AK	9615as					
1300	1400		Costa Rica, RF Peace Intl	25930va						1300	1400		USA, KTNB Salt Lake City UT	7510na					
1300	1400		Ecuador, HCJB	12005am	15115am	21455va				1300	1400		USA, KWHR Naalehu HI	9930as	11565as				
1300	1330		Egypt, Radio Cairo	17595as						1300	1400		USA, Voice of America	6110as	9355as	9645as	9760as		
1300	1400		Eqt Guinea, Radio Africa	15186af										11705as	11715as	15425as	21665as		
1300	1400		France, Radio France Intl	15155eu	15195eu					1300	1400	mtwhf	USA, WBCQ Monticello ME	9340na					
1300	1329		Germany, Deutsche Welle	6140eu						1300	1400		USA, WEWB Birmingham AL	11875na	15745eu				
1300	1400	a	Germany, Good News World R	15330as						1300	1400	mtwhf	USA, WGTG McCaysville GA	9400va	12172am				
1300	1400		Germany, Overcomer Ministries	5850eu						1300	1400		USA, WHRI Noblesville IN	6040na	15105am				
1300	1330	s	Germany, Universal Life	9955na						1300	1400		USA, WJCR Upton KY	7490na	13595na				
1300	1400		Ghana, Ghana BC Corp	4915do	6130do					1300	1315	smtwhf	USA, WRMI/R Miami Intl	9955am					
1300	1400		Jordan, Radio	11690eu						1300	1400		USA, WRNO New Orleans LA	7395na					
1300	1320	wfa	Kazakhstan, R Almaty	9620eu	11840eu					1300									

Sundays

1300 Australia, Radio: RA News. See S 0000.

1300 Ecuador, HCJB Quito (am): Weekend Magazine. A new program hosted by Steve Johnson.

1300 Germany, Deutsche Welle: Weekend. See S 0000.

1300 S Africa, Channel Africa: News. See S 0300.

1305 Australia, Radio: Country Club (Part 2). ABC's program of contemporary and traditional country music with Richard Porteous (2nd Hour).

1330 Ecuador, HCJB Quito (am): Mountain Meditations. A mixture of music and devotional thoughts in an Andean setting.

1330 India, All India Radio: News and Commentary. See S 0030.

1345 India, All India Radio: Program Preview. A look at today's program lineup.

1346 India, A.I.R.: Musical Interlude. A musical filler program.

Monday-Friday

1300 Australia, Radio: RA News. See S 0000.

1300 Ecuador, HCJB Quito (am): Precept with Kay Arthur. Kay Arthur offers a fresh approach to daily Bible study.

1313 Ecuador, HCJB Quito (am): Getting the Message. Two minutes of Bible interpretation.

1315 Australia, Radio: The Planet (Part 1). Lucky Oceans plays richly varied music from around the world.

1315 Ecuador, HCJB Quito (am): Proclaim! Daily encouragement for godly living with Dr. Joseph Stowell, President of the Moody Bible Institute.

1328 Ecuador, HCJB Quito (am): Moments with The Word. New program - no information available.

1330 Ecuador, HCJB Quito (am): Leading the Way. James Dobson of Focus on the Family.

1330 India, All India Radio: News and Commentary. See S 0030.

1345 India, All India Radio: Program Preview. See S 1345.

1356 Ecuador, HCJB Quito (am): Bibles for the World. See M 1328.

1358 Ecuador, HCJB Quito (am): The Bible Minute. It's actually two minutes.

Mondays

1300 Germany, Deutsche Welle: Spectrum. See S 0315.

Tuesdays

1300 Germany, DW: International Co-Production. See S 1200.

Wednesdays

1300 Germany, Deutsche Welle: Marks and Markets. See S 0515.

1346 India, All India Radio: Indian Music. Traditional indian music played with original instruments.

Thursdays

1300 Germany, Deutsche Welle: Arts on the Air. See S 1615.

1346 India, All India Radio: Listeners' Choice. Indian music requests from listeners.

Fridays

1300 Germany, Deutsche Welle: Focus on Folk. See M 1230.

1346 India, All India Radio: Indian Music. See W 1346.

Saturdays

1300 Australia, Radio: Radio National News. News from the Australian Broadcasting Network (ABC).

1300 Ecuador, HCJB Quito (am): Toonz! Music for children.

1300 Germany, Deutsche Welle: Inside Europe. See S 0115.

1300 S Africa, Channel Africa: News. See S 0300.

1305 Australia, Radio: Science Show. See T 0110.

1330 India, All India Radio: News and Commentary. See S 0030.

1345 India, All India Radio: Program Preview. See S 1345.

1346 India, All India Radio: UN News Magazine. The United Nations daily news program.

FREQUENCIES

1500	1600		Anguilla, Caribbean Beacon	11775am					1500	1600		Seychelles, FEBA Radio	11600as				
1500	1600	vl	Australia, ABC/Alice Springs	2310do					1500	1600		Sierra Leone, SLBS	5980do				
1500	1600		Australia, ABC/Katherine	2485do					1500	1600		Singapore, Radio Corp Singapore	6150do				
1500	1600	vl	Australia, ABC/Tennant Creek	2325do					1500	1600		Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as	
1500	1600		Australia, Radio	5995as	6180as	9580as	11650as						15425as				
				11660as					1500	1600	as	Tanzania, Radio	5050af				
1500	1600	vl	Botswana, Radio	4820do	4830do	7255do			1500	1530		Turkey, Voice of	15295as	17815eu			
1500	1600	vl	Canada, CBC N Quebec Svc	9625do					1500	1600		Uganda, Radio	4976do				
1500	1600		Canada, CFRX Toronto	6070do					1500	1600		UK, BBC World Service	5975as	5990as	6190af	6195as	
1500	1600		Canada, CFVP Calgary	6030do								9410eu	9515na	9590na	9740as		
1500	1600		Canada, CHNX Halifax	6130do								11860af	12095eu	15220na			
1500	1600		Canada, CKZN St John's	6160do								15310as	15400af	15420af			
1500	1600		Canada, CKZU Vancouver	6160do								15485eu	15565eu	17630as			
1500	1600		Canada, Radio Canada Intl	6185as								17830af	17840am	21470af			
1500	1600	s	Canada, Radio Canada Intl	9640na	13655na	17710na						21490af	21660af				
1500	1556		China, China Radio Intl	7160as	7405as	9785as	13685af		1500	1600	a	UK, Merlin Network One	9605eu	13640eu	15510eu		
				15125af					1500	1600		USA, Armed Forces Network	4278am	6458am	12689am		
1500	1600		Costa Rica, RF Peace Intl	25930va					1500	1600		USA, KAIJ Dallas TX	13815na				
1500	1600		Ecuador, HCJB	12005am	15115am	21455va			1500	1600		USA, KJES Vado NM	11715na				
1500	1600		Eqt Guinea, Radio Africa	15186af					1500	1600		USA, KTBN Salt Lake City UT	7510na				
1500	1600		Germany, Overcomer Ministries	5850eu	13810eu				1500	1600		USA, KWHR Noalehu HI	9930as				
1500	1600		Germany, Voice of Hope	15715as					1500	1600		USA, VOA Special English	6110as	9760as	9845as		
1500	1600		Guam, TWR/KTWR	15330as								12040as	15460as				
1500	1600		Japan, Radio/NHK	7200as	9505na	9750as	11730as		1500	1600		USA, Voice of America	7125as	9575as	15205as		
1500	1600		Jordan, Radio	11690eu								15340as					
1500	1600		Kenya, Kenya BC Corp	4935do					1500	1600	mtwhf	USA, WBCQ Monticello ME	9340na				
1500	1600		Lebanon, Voice of Hope	11530va					1500	1600		USA, WEWN Birmingham AL	11875na	15745eu			
1500	1600	vl	Lesotho, Radio	4800do					1500	1600	mtwhfa	USA, WGTG McCaysville GA	9400va	12172am			
1500	1510		Liberia, LCN/R Liberia Int	5100do					1500	1600		USA, WHRI Noblesville IN	6040sa	15105na			
1500	1600		Malaysia, Radio	7295do					1500	1600		USA, WJCR Upton KY	7490na	13595na			
1500	1600	vl	Malaysia, RTM Kota Kinabalu	5980do					1500	1600	irreg	USA, WMLK Bethel PA	9465am				
1500	1600		Malaysia, RTM Sarawak	7160do					1500	1600		USA, WRNO New Orleans LA	7395na				
1500	1600		N Marianas, KFB5 Saipan	9465as	9495as	9670as			1500	1600		USA, WTJC Newport NC	9370na				
1500	1600		Netherlands, Radio	12070as	12090as	15590as			1500	1600		USA, WWCN Nashville TN	9475na	12160na	13845na		
1500	1505	occsnal	New Zealand, R NZ Intl	6105va								15685na					
1500	1505	occsnal	New Zealand, R NZ Intl	6105as					1500	1600		USA, WYFR Okeechobee FL	11830na	17760na			
1500	1600	vl	Nigeria, Radio/Enugu	6025do					1500	1600		Zambia, Christian Voice	9865do				
1500	1600	vl	Nigeria, Radio/Ibadan	6050do					1500	1600	vl	Zimbabwe, Zimbabwe BC	5975do				
1500	1600	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		1505	1600	occsnal	New Zealand, R NZ Intl	6145va				
1500	1600	vl	Nigeria, Radio/Lagos	4990do	7285do				1515	1600	vl	Malawi, MBC	3380do				
1500	1600	vl	Nigeria, Voice of	7255af	15120va				1530	1540		Bangladesh, Bangla Betar	4880as	15520as			
1500	1556		North Korea, R Pyongyang	4405va	6574na	9335na	11710na		1530	1600		Iran, VOIRI	7250as	11680as	13605as		
				13760na								15150as					
1500	1600		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as		1530	1600		Mongolia, Voice of	9720as	12085as			
1500	1600	vl	Papua New Guinea, NBC	4890do					1545	1600	sh	Bangladesh, Bangla Betar	4880as	15520as			
1500	1530		S Africa, Channel Africa	17770af					1550	1600		Vatican City, Vatican R	9865au	13765au	15500au		

SELECTED PROGRAMS

Sundays

- 1500 Australia, Radio: RA News. See S 0000.
- 1500 Nigeria, Voice of: Perspectives (biweekly). Global issues from the Nigerian and African point of view.
- 1500 Nigeria, Voice of: Reaching Out (biweekly). A review of both government and private projects of a humanitarian nature.
- 1500 S Africa, Channel Africa: News. See S 0300.
- 1500 USA, WRM/R Miami Int'l, FL: Universal Life.
- 1505 Australia, Radio: Encounter. This highly acclaimed Radio National series explores the connections between religion and life.
- 1530 Nigeria, Voice of: In the News. Fifteen minutes of the news behind the news.
- 1530 USA, WRM/R Miami Int'l, FL: Battle Cry Sounding.
- 1555 Australia, Radio: On This Day. Anniversaries worth remembering.

Monday-Friday

- 1500 Australia, Radio: RA News. See S 0000.
1500 S Africa, Channel Africa: News. See S 0300.
1505 Australia, Radio: Asia Pacific. See M 1105.
1505 S Africa, Channel Africa: Dateline Africa. A 25-minute news magazine for and about Africa.
1530 Nigeria, Voice of: Sixty Minutes. A news magazine program of world and Nigerian news, correspondent reports, press review, and sports.

Mondays

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| 1500 | Nigeria, Voice of: Health Corner (biweekly). Health-related problems and medical research and innovations. |
| 1500 | Nigeria, Voice of: Towards a Common Destiny (biweekly). Analyses of the economic and political issues which link African countries in their development. |
| 1530 | Australia, Radio: The Health Report. A program that examines health issues and makes complex scientific data understandable. |

Tuesdays

- 1500 Nigeria, Voice of: *Bridge Across Time* (biweekly). Focus on the struggle for reparations for harm done to Africans through slave trade and colonialism.
- 1500 Nigeria, Voice of: *Striding Ahead* (biweekly). The contributions of Nigerian women in particular and African women in general to national development.
- 1530 Australia, Radio: *The Law Report*. See T 0030.

Wednesdays

- 1500 Nigeria, Voice of: Nigeria and Politics. Happenings on the Nigerian political scene.
- 1515 Nigeria, Voice of: World of the Arts.
- 1530 Australia. Radio: The Religion Report. See W 0030.

Thursdays

- 1500 Nigeria, Voice of: Talking Agriculture (biweekly).
1500 Nigeria, Voice of: Theatre on the Air (biweekly). A radio drama which reflects the rich social and cultural value of the society.
1530 Australia, Radio: Media Report. See H 0030.

Fridays

- 1500 Nigeria, Voice of: The Developing World. Global developments from the perspective of the developing countries of the world.
- 1530 Australia, Radio: The Sports Factor. See F 0030.

Saturdays

- 1500 Australia, Radio: RA News. See S 0000.
- 1500 Nigeria, Voice of: The Young World (biweekly). The activities, experiences, hopes, and aspirations of Nigerian youth are highlighted.
- 1500 Nigeria, Voice of: Who are the Nigerians (biweekly). A program that seeks to trace ethnic diversity of Nigeria.
- 1500 S Africa, Channel Africa: Network Africa. See S 0505.
- 1505 Australia, Radio: Melisma (Part 1). Musical revelations (1st hour).
- 1530 Nigeria, Voice of: Africa Hour. A news magazine devoted exclusively to African issues.

FREQUENCIES

1600 1700	Algeria, R Algiers Intl	11715af	15160me	1600 1700 vl	Papua New Guinea, NBC	4890do			
1600 1700	Anguilla, Caribbean Beacon	11775am		1600 1700	Russia, Voice of Russia WS	7260me	9800as	9875as	11500as
1600 1700 vl	Australia, ABC/Alice Springs	2310do				11695as			
1600 1700 vl	Australia, ABC/Katherine	2485do		1600 1630	S Africa, Channel Africa	9525af			
1600 1700 vl	Australia, ABC/Tennant Creek	2325do		1600 1700	Sierra Leone, SLBS	5980do			
1600 1700	Australia, Radio	5995as	6180as	1600 1700	South Korea, R Korea Intl	5975om	9515af	9870af	
		9580as	11650as	1600 1700	Swaziland, Trans World R	9500af			
		17865na		1600 1615	Switzerland, Swiss R Intl	12010as	15185as		
1600 1630	Austria, Radio Austria Intl	4820do	4830do	1600 1700	Tanzania, Radio	5050af			
1600 1700 vl	Botswana, Radio	9625do	7255do	1600 1640	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600 1700 vl	Canada, CBC N Quebec Svc	6070do		1600 1700	Uganda, Radio	4976do			
1600 1700	Canada, CFRX Toronto	6030do		1600 1700	UK, BBC World Service	3195as	5975as	5990as	6190af
1600 1700	Canada, CFVP Calgary	6130do				6195as	7160as	9410eu	9515na
1600 1700	Canada, CHNX Halifax	6160do				9740as	11940af	12095eu	15240af
1600 1700	Canada, CKZN St John's	6160do				15310as	15400af	15545eu	15565eu
1600 1700	Canada, CKZU Vancouver	9640na	13655na			17630as	17830af	17840am	21470af
1600 1659 s	Canada, Radio Canada Intl	9565af	9870af			21660af			
1600 1656	China, China Radio Intl	25930va		1600 1700 a	UK, Merlin Network One	3965eu	9655eu		
1600 1700	Costa Rica, RF Peace Intl	12005am	15115am	1600 1700	UK, Merlin Network One	3965eu	9655eu		
1600 1630	Ecuador, HCJB	15186af		1600 1700	UK, Merlin Network One	9655eu			
1600 1700	Eqt Guinea, Radio Africa	7165af	9560af	1600 1700	USA, Armed Forces Network	4278am	6458am	12689am	
1600 1700	Ethiopia, Radio	11615af	11995af	1600 1700	USA, KAIJ Dallas TX	13815va			
1600 1700	France, Radio France Intl	15210af	17850af	1600 1700	USA, KJES Vado NM	11715na			
		6140eu	6170as	1600 1700	USA, KTBN Salt Lake City UT	15590na			
1600 1645	Germany, Deutsche Welle	11785as	15145af	1600 1700	USA, KWHR Naalehu HI	9930as			
		17800af	17810as	1600 1700	USA, VOA Special English	13600af	15445af	17895af	
		15105af		1600 1700	USA, Voice of America	6035af	6110as	7125as	9575as
1600 1700 a	Germany, Good News World R	5850eu	13810me			9760as	11920af	12040af	13710af
1600 1700	Germany, Overcomer Ministries	15105af				15205as	15225af	15240af	21635as
1600 1630 s	Germany, Universal Life	15715as		1600 1700 mtwhf	USA, WBCQ Monticello ME	9340na			
1600 1630	Germany, Voice of Hope	9355as		1600 1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600 1700	Guam, AWR/KSDA	15330as		1600 1700	USA, WGTG McCaysville GA	9400va	12172am		
1600 1630 as	Guam, TWR/KTWR	7250as	11680as	1600 1700	USA, WHRA Greenbush ME	17650af			
1600 1630	Iran, VOIRI	15150as	13605as	1600 1700	USA, WHRI Noblesville IN	13760na	15105sa		
1600 1630	Israel, Kol Israel	15650va	17535va	1600 1700	USA, WJCR Upton KY	7490na	13595na		
1600 1700	Jordan, Radio	11690eu		1600 1700	USA, WRNO New Orleans LA	7395na	15420va		
1600 1700	Kenya, Kenya BC Corp	4935do		1600 1700	USA, WSHB Cypress Crk SC	18915af			
1600 1700	Lebanon, Voice of Hope	6280me	11530va	1600 1700	USA, WTJC Newport NC	9370na			
1600 1700 vl	Lesotho, Radio	4800do		1600 1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600 1700 vl	Malawi, MBC	3380do		1600 1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17510eu
1600 1700	Malaysia, Radio	7295do				17760na	21525af		
1600 1630	Mexico, Radio Mexico Intl	9705am		1600 1630 a	Vatican City, Vatican R	9865au	13765au	15500au	
1600 1700	N Marianas, KFB5 Saipan	9465as	9495as	1600 1700	Zambia, Christian Voice	4965do			
1600 1625	Netherlands, Radio	12070as	12090as	1600 1630 vl	Zimbabwe, Zimbabwe BC	5975do			
1600 1650	New Zealand, R NZ Intl	6145va		1605 1615 mtwhf	UK, BBC World Service	5990as			
1600 1700 vl	Nigeria, Radio/Enugu	6025do		1615 1630 a	UK, BBC World Service	11860af			
1600 1700 vl	Nigeria, Radio/Ibadan	6050do		1630 1645	Egypt, Radio Cairo	11875af	15255af		
1600 1700 vl	Nigeria, Radio/Kaduna	4770do	6090do	1630 1700 s	Seychelles, FEBA Radio	11605as			
		9570do	7275do	1630 1645 a	UK, BBC World Service	9515na	11860af		
1600 1700 vl	Nigeria, Radio/Lagos	3326do	4990do	1630 1657	Vietnam, Voice of	7145eu	9730eu		
1600 1700	Nigeria, Voice of	7255af	15120va	1630 1700 vl	Zimbabwe, Zimbabwe BC	4828do			
1600 1656	North Korea, R Pyongyang	3560va	6540va	1645 1700	Egypt, Radio Cairo	15255af			
		9975va	9600va	1645 1700	Germany, Deutsche Welle	6140eu			
1600 1630	Pakistan, Radio	7230do	11570me	1645 1700 a	UK, BBC World Service	9515na			
		15465me	17720af	1645 1700 smwfa	UK, BBC World Service	11860af			
1600 1700	Palau, KHBN/Voice of Hope	9955as	9965as	1650 1700 mtwhf	New Zealand, R NZ Intl	17675va			

SELECTED PROGRAMS

Sundays

- 1600 Australia, Radio: RA News. See S 0000.
1600 Germany, Deutsche Welle: News. See S 0100.
1600 S Africa, Channel Africa: News. See S 0300.
1605 Australia, Radio: The National Interest. Terry Lane takes an incisive look at the week's major events.
1606 Germany, Deutsche Welle: Religion and Society. See S 1106.
1615 Germany, Deutsche Welle: Arts on the Air. A program of reports and interviews on major cultural events and developments hosted by Gareth Evans.
1615 Germany, Deutsche Welle: Cool. See S 1115.
1615 Germany, Deutsche Welle: Feature of the Month (1). A special feature on important developmental issues of our time.
1645 Germany, Deutsche Welle: The History of Germany. A series tracing the history of Germany from earliest times.

Monday-Friday

- 1600 Australia, Radio: RA News. See S 0000.
1600 Germany, Deutsche Welle: News. See S 0100.

- 1600 S Africa, Channel Africa: News. See S 0300.
1606 Germany, Deutsche Welle: NewsLink. See M 1106.
1630 Germany, Deutsche Welle: Africa Report. See M 1130.
1630 Germany, Deutsche Welle: Asia-Pacific Report (live). Correspondent reports, interviews and background news from the Asia-Pacific region.

Mondays

- 1605 Australia, Radio: Music Deli. Paul Petran present music from a variety of cultures.

Tuesdays

- 1605 Australia, Radio: The Comfort Zone. Architecture and design, gardens, food and travel with Alan Saunders.
1645 Germany, Deutsche Welle: Man and Environment. See S 1245.

Wednesdays

- 1605 Australia, Radio: Verbatim. New program--no information available.
1630 Australia, Radio: Earshot. See W 1605.
1645 Germany, Deutsche Welle: Insight. See W 0130.

Thursdays

- 1605 Australia, Radio: Hindsight. Michelle Raymer presents current events from an historical perspective.
1645 Germany, Deutsche Welle: Living in Germany. See S 0145.

Fridays

- 1605 Australia, Radio: Away!. See M 0110.
1645 Germany, Deutsche Welle: Spotlight on Sport. See F 0130.

Saturdays

- 1600 Australia, Radio: RA News. See S 0000.
1600 Germany, Deutsche Welle: News. See S 0100.
1600 S Africa, Channel Africa: News. See S 0300.
1605 Australia, Radio: Melisma (Part 2). Musical revelations (2nd hour).
1606 Germany, Deutsche Welle: Talking Point. See A 1106.
1615 Germany, Deutsche Welle: Spectrum. See S 0315.
1645 Germany, Deutsche Welle: Development Forum Asia. See S 1230.



FREQUENCIES

1700	1730		Afghanistan, VO Shariah	4774do	7077do					1800	1900		Anguilla, Caribbean Beacon	11775am					
1700	1800		Anguilla, Caribbean Beacon	11775am						1800	1900		Argentina, RAE	15345eu					
1700	1800	vl	Australia, ABC/Alice Springs	2310do						1800	1900	mtwhf	Australia, ABC/Alice Springs	2310do					
1700	1800	vl	Australia, ABC/Katherine	2485do						1800	1900	vl	Australia, ABC/Katherine	2485do					
1700	1800	vl	Australia, ABC/Tennant Creek	2325do						1800	1900	vl	Australia, ABC/Tennant Creek	2325do					
1700	1800	vl	Australia, Radio	5995as 9660as	6180as 11880as	9500as	9580as			1800	1900		Australia, Radio	6080as 9600as	7240as 11880as	9500as	9580as		
1700	1800	vl	Botswana, Radio	4820do	4830do	7255do				1800	1900		Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu		
1700	1800	vl	Canada, CBC N Quebec Svc	9625do						1800	1900	vl	Botswana, Radio	4820do	4830do				
1700	1800		Canada, CFRX Toronto	6070do						1800	1900		Canada, CFRX Toronto	6070do					
1700	1800		Canada, CFVP Calgary	6030do						1800	1900		Canada, CFVP Calgary	6030do					
1700	1800		Canada, CHNX Halifax	6130do						1800	1900		Canada, CHNX Halifax	6130do					
1700	1800		Canada, CKZN St John's	6160do						1800	1900		Canada, CKZN St John's	6160do					
1700	1800		Canada, CKZU Vancouver	6160do						1800	1900		Canada, CKZU Vancouver	6160do					
1700	1756		China, China Radio Intl	7150af 11910af	7405af 15300af	9570af	9670af			1800	1900		Costa Rica, RF Peace Intl	25930va					
1700	1800		Costa Rica, RF Peace Intl	25930va						1800	1830		Czech Rep, R Prague Intl	5930eu	7315va				
1700	1727		Czech Rep, R Prague Intl	5930eu	17485af					1800	1900		Egypt, Radio Cairo	15255af	15186af				
1700	1800		Egypt, Radio Cairo	15255af						1800	1900		Egt Guinea, Radio Africa	15186af					
1700	1800		Egt Guinea, Radio Africa	15186af						1800	1900	vl	Germany, Deutsche Welle	6140eu					
1700	1730		France, Radio France Intl	11615af	15210af					1800	1900	vl	Ghana, Ghana BC Corp	4915do					
1700	1800		Germany, Deutsche Welle	6140eu						1800	1815		Greece, Voice of	7450eu	9425eu	17565sa	17705na		
1700	1800	a	Germany, Good News World R	11795me						1800	1900		India, All India Radio	7410eu 13750af	9950eu 15075af	11620ua	11935af		
1700	1800		Germany, Voice of Hope	11725as						1800	1900	vl	Italy, IRRS	3985va					
1700	1800	vl	Ghana, Ghana BC Corp	4915do						1800	1830		Jordan, Radio	11690eu					
1700	1800		Japan, Radio/NHK	9825eu	12000na	15355af				1800	1900		Kenya, Kenya BC Corp	4935do					
1700	1800		Jordan, Radio	11690eu						1800	1900		Kuwait, Radio	11990va					
1700	1800		Kenya, Kenya BC Corp	4935do						1800	1900	vl	Lesotho, Radio	4800do					
1700	1800		Lebanon, Voice of Hope	6280me	11530va					1800	1815		Liberia, LCN/R Liberia Int	5100do					
1700	1800	vl	Lesotho, Radio	4800do						1800	1900	vl	Malawi, MBC	3380do					
1700	1800	vl	Malawi, MBC	3380do						1800	1900		Malaysia, Radio	7295do					
1700	1800		Malaysia, Radio	7295do						1800	1900		N Marianas, KFB5 Saipan	9465as					
1700	1730		Mexico, Radio Mexico Intl	9705am						1800	1830		Netherlands, Radio	6020af	11655af				
1700	1800		N Marianas, KFB5 Saipan	9465as						1800	1850	mtwhf	New Zealand, R NZ Intl	17675va					
1700	1800	mtwh	New Zealand, R NZ Intl	17675va						1800	1900	vl	Nigeria, Radio/Enugu	6025do					
1700	1800	vl	Nigeria, Radio/Enugu	6025do						1800	1900	vl	Nigeria, Radio/Ibadan	6050do					
1700	1800	vl	Nigeria, Radio/Ibadan	6050do						1800	1900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		
1700	1800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do			1800	1900	vl	Nigeria, Radio/Lagos	3326do	4990do				
1700	1800	vl	Nigeria, Radio/Lagos	3326do	4990do					1800	1900	vl	Nigeria, Radio/Lagos	3326do	4990do				
1700	1800		Nigeria, Radio/Lagos	3326do	4990do					1800	1900	vl	Nigeria, Voice of	7255af	15120va				
1700	1800	vl	Palau, KHBN/Voice of Hope	9955as	9965as					1800	1900	vl	North Korea, R Pyongyang	3760va	11710va				
1700	1800		Papua New Guinea, NBC	4890do						1800	1900		Palau, KHBN/Voice of Hope	9965as					
1700	1756		Romania, R Romania Intl	9625eu 15365eu	11740eu	11940eu				1800	1900	vl	Papua New Guinea, NBC	4890do					
1700	1800		Russia, Voice of Russia WS	4940me 12055me	4965me	7260me	7305as			1800	1900	vl	Philippines, R Pilipinas	11720as	15190as	17720as			
1700	1730		S Africa, Channel Africa	17870af						1800	1900		Russia, Voice of Russia WS	5935me	7260me	7445me	9470me		
1700	1800		Sierra Leone, SLBS	5980do						1800	1830		S Africa, AWR Africa	5960af	6100af				
1700	1715		Swaziland, Trans World R	9500af						1800	1830		S Africa, Channel Africa	17870af					
1700	1800		Tanzania, Radio	5050af						1800	1900	vl	Sierra Leone, SLBS	3316do					
1700	1800		Uganda, Radio	4976do						1800	1810		Solomon Islands, SIBC	5020do					
1700	1800		UK, BBC World Service	3255af 6190af	3915af 6195eu	5975as 7160as	6005af 9410eu			1800	1900		Somalia, Radio Mogadishu	6690af					
1700	1800			6190af	6195eu	7160as	9410eu			1800	1900		Sudan, Radio Omdurman	9200va					
1700	1800			9510as	9630af	9740as				1800	1830		Swaziland, Trans World R	9500af					
1700	1800			11980me	12095eu	15400af				1800	1900		Taiwan, Radio Taiwan Intl	3965eu					
1700	1800			15420af	17830af	17840na				1800	1900		Tanzania, Radio	5050af					
1700	1800	a	UK, Merlin Network One	3965eu	9655eu					1800	1900		UK, BBC World Service	3255af	3955eu	6190af	6195eu		
1700	1800	mtwhf	UK, Merlin Network One	6185eu						1800	1900			9410eu	9510as	9740pa			
1700	1800		USA, Armed Forces Network	4278am	6458am	12689am				1800	1830		UK, RTE Radio	11980me	12095eu	15400af	15420af		
1700	1800		USA, KAIJ Dallas TX	13815va						1800	1900			17830af	17840na				
1700	1800		USA, KTBN Salt Lake City UT	15590na						1800	1900		USA, Armed Forces Network	4278am	6458am	12689am			
1700	1800		USA, KWHR Naalehu HI	9930as						1800	1900		USA, KAIJ Dallas TX	13815va					
1700	1800		USA, Voice of America	6040af	6110as	7125as	9760as			1800	1900		USA, KJES Vado NM	15385na					
1700	1800			11920af	12040af	15205as				1800	1900		USA, KTBN Salt Lake City UT	15590na					
1700	1800	mtwhf	USA, Voice of America	5990as 9795as	6045as 11955as	9525as 12005as	9670as			1800	1900		USA, KWHR Naalehu HI	9930as					
1700	1800			15255as						1800	1900	mtwhf	USA, WBCQ Monticello ME	9340na					
1700	1800	mtwhf	USA, WBCQ Monticello ME	9340na						1800	1900		USA, WEWN Birmingham AL	11875na	13615na	15745eu			
1700	1800		USA, WEWN Birmingham AL	11875na	13615na	15745eu				1800	1900		USA, WGTG McCaysville GA	9400va	12172am				
1700	1800		USA, WGTG McCaysville GA	9400va	12172am					1800	1900		USA, WHRA Greenbush ME	17650af					
1700	1800		USA, WHRA Greenbush ME	17650af						1800	1900		USA, WHRI Noblesville IN	9495sa	13760na				
1700	1800		USA, WHRI Noblesville IN	13760na	15105as					1800	1900		USA, WINB Red Lion PA	13800eu					
1700	1800		USA, WINB Red Lion PA	13800eu						1800	1900	irreg	USA, WJCR Upton KY	7490na	13595na				
1700	1800	irreg	USA, WJCR Upton KY	7490na	13595na					1800	1900		USA, WMLK Bethel PA	9465am					
1700	1800		USA, WMLK Bethel PA	9465am						1800	1900		USA, WRNO New Orleans LA	7395na	15420va				
1700	1800		USA, WRNO New Orleans LA	7395na	15420va					1800	1900		USA, WSHB Cypress Crk SC	15665eu	18915af				
1700	1800		USA, WSHB Cypress Crk SC	18915af						1800	1900		USA, WTJC Newport NC	9370na					
1700	1800		USA, WTJC Newport NC	9370na						1800	1900		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na		
1700	1800		USA, WWCR Nashville TN	9475na	12160na	13845na				1800	1900	vl	USA, WYFR Okeechobee FL	15695eu					
1700	1800			15685na						1800	1827		Vanuatu, Radio	4960do					
1700	1800		USA, WYFR Okeechobee FL	15695eu	17510eu					1800	1900		Vietnam, Voice of	7145eu	7440eu				
1700	1800	vl	Zambia, Christian Voice	4965do						1800	1900		Yemen, Rep of Yemen Radio	9780me					
1700	1800	vl	Zimbabwe, Zimbabwe BC	4828do						1800	1900		Zambia, Christian Voice	4965do					
1715	1800		Libya, Voice of Africa	15235va	15415va	15435va				1800	1810	vl	Zambia, ZBC Radio 4	4848do					
1715	1800	fa	Swaziland, Trans World R	3200af	9500af					1800	1830		Zimbabwe, Zimbabwe BC	4828do					
1720	1750		Armenia, Trans World R	7375eu						1815	1830		Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu		
1730	1800		Austria, Radio Austria Intl	6155va 13730va	9655va	13710va				1820	1850	ascension	Monaco, Trans World Radio	15595eu					
1730	1800		Georgia, Georgian Radio	6180me						1830	1900		Is, RTE Radio	7375as					
1730	1800		Guam, AWR/KSDA	7455as	7560as					1830	1900		Canada, RTE Radio	21630af					
1730	1800		Netherlands, Radio	6020af	11655af					1830	1900		Kiribati, Radio	13640va					
1730	1800		Philippines, R Pilipinas	11720as	15190as	17720as				1830	1900		Netherlands, Radio	9810do					
1730	1800	s	S Africa, AWR Africa	12130af						1830	1900			6020af	9895af	11655af	13700af		
1730	1800		UK, BBC World Service	5985as 11660as	7390as														



FREQUENCIES

1900	2000		Anguilla, Caribbean Beacon	11775am					2000	2100		Algeria, R Algiers Intl	11715af	15160me		
1900	2000	vl	Australia, ABC/Katherine	2485do					2000	2100		Angola, Radio Nacional	3355af			
1900	2000		Australia, ABC/Tennant Creek	2325do					2000	2100		Anguilla, Caribbean Beacon	11775am			
1900	2000		Australia, Radio	6080as	7240as	9500as	9580as		2000	2100	vl	Australia, ABC/Alice Springs	2310do			
				9600as	11880as				2000	2100	vl	Australia, ABC/Katherine	2485do			
1900	1930		Azerbaijan, Voice of	9165eu					2000	2100	vl	Australia, ABC/Tennant Creek	2325do			
1900	2000	vl	Botswana, Radio	4820do	4830do				2000	2100		Australia, Radio	9500as	9580as	9660as	11880as
1900	2000		Canada, CFRX Toronto	6070do					2000	2100	as	Australia, Radio	6080as	7240as		
1900	2000		Canada, CFVP Calgary	6030do					2000	2100	vl	Botswana, Radio	4820do	4830do		
1900	2000		Canada, CHNX Halifax	6130do					2000	2100		Canada, CFRX Toronto	6070do			
1900	2000		Canada, CKZN St John's	6160do					2000	2100		Canada, CFVP Calgary	6030do			
1900	2000		Canada, CKZU Vancouver	6160do					2000	2100		Canada, CHNX Halifax	6130do			
1900	1956		China, China Radio Intl	6165af	9440af	9595af	11840af		2000	2100		Canada, CKZN St John's	6160do			
				15360af					2000	2100		Canada, CKZU Vancouver	6160do			
1900	2000		Costa Rica, RF Peace Intl	25930va					2000	2056		China, China Radio Intl	5965eu	7590af	9440af	9535eu
1900	2000		Ecuador, HCJB	17660eu	21455va							11735af1	1840af	13675af	15360af	15500af
1900	2000		Eq Guinea, Radio Africa	15186af					2000	2100		Costa Rica, RF Peace Intl	25930va			
1900	1945		Germany, Deutsche Welle	11765af	11810af	13610af	15390af		2000	2100		Ecuador, HCJB	17660eu	21455va		
				17810af					2000	2100		Eq Guinea, Radio Africa	15186af			
1900	1910		Greece, Voice of	7475eu	9375eu				2000	2020	s	Finland, YLE/R Finland	6135eu			
1900	1950	a	Greece, Voice of	7450eu	9425eu	17565sa	17705na		2000	2030		Finland, YLE/R Finland	6135eu			
1900	2000	s	Greece, Voice of	7450eu	9425eu	17565sa	17705na		2000	2045		Germany, Deutsche Welle	9725eu			
1900	2000		Guatemala, Adv World Radio	5980am					2000	2100		Germany, Overcomer Ministries	3965eu			
1900	1945		India, All India Radio	7410eu	9950eu	11620eu	11935af		2000	2100	vl	Ghana, Ghana BC Corp	4915do			
				13750af	15075af	15200af			2000	2100		Guatemala, Adv World Radio	5980am			
1900	2000	vl	Italy, IRRS	3985va					2000	2100		Indonesia, Voice of	11784va			
1900	2000		Kenya, Kenya BC Corp	4885do	4935do				2000	2030		Iran, VOIRI	7215eu	9022eu	9880eu	
1900	2000		Kiribati, Radio	9810do					2000	2100	vl	Italy, IRRS	3985va			
1900	2000		Kuwait, Radio	11990va					2000	2100		Kenya, Kenya BC Corp	4885do	4935do		
1900	2000	vl	Lesotho, Radio	4800do					2000	2100		Kiribati, Radio	9810do			
1900	1915		Liberia, LCN/R Liberia Int	5100do					2000	2100	vl	Kuwait, Radio	11990va			
1900	2000	vl	Malawi, MBC	3380do					2000	2055		Lesotho, Radio	4800do			
1900	2000		Malaysia, Radio	7295do					2000	2100	vl	Liberia, LCN/R Liberia Int	5100do			
1900	2000		N Marianas, KFBS Saipan	9465as					2000	2030		Malawi, MBC	3380do			
1900	2000		Netherlands, Radio	6020af	9895af	11655af	13700af		2000	2100		Malaysia, Radio	7295do			
				17605af					2000	2030		Mongolia, Voice of	9720eu	12085eu		
1900	2000		New Zealand, R NZ Intl	17675va					2000	2100		Namibia, NBC	3270af	3289af		
1900	2000	vl	Nigeria, Radio/Enugu	6025do					2000	2025		Netherlands, Radio	6020af	9895af	11655af	13700af
1900	2000	vl	Nigeria, Radio/Ibadan	6050do								17605af				
1900	2000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		2000	2100		New Zealand, R NZ Intl	17675va			
1900	2000	vl	Nigeria, Radio/Lagos	3326do	4990do				2000	2015	vl	Niger, Voice du Sahel	5019do			
1900	2000		Nigeria, Voice of	7255af	15120va				2000	2100	vl	Nigeria, Radio/Enugu	6025do			
1900	2000		North Korea, R Pyongyang	4405va	6574na	9335na	11710na		2000	2100	vl	Nigeria, Radio/Ibadan	6050do			
				13760na					2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1900	1930	m-a/vl	Papua New Guinea, NBC	4890do	9675do				2000	2100	vl	Nigeria, Radio/Lagos	3326do	4990do		
1900	1930		Philippines, R Pilipinas	11720as	15190as	17720as			2000	2005		Nigeria, Voice of	7255af	15120va		
1900	1955		Poland, Radio Polonia	6000eu	7285eu				2000	2100	vl	Papua New Guinea, NBC	9675do			
1900	2000		Russia, Voice of Russia WS	5940eu	5965eu	9340eu	9480eu		2000	2100		Russia, Voice of Russia WS	5920eu	5940eu	5965eu	7205va
				9890eu	11510af				2000	2005		7340eu	9480eu	9875af	9890eu	11510af
1900	2000		Sierra Leone, SLBS	3316do					2000	2100		S Africa, Voice of Hope	6290af			
1900	2000	vl	Solomon Islands, SIBC	5020do					2000	2100		Sierra Leone, SLBS	3316do			
1900	2000		South Korea, R Korea Intl	5975om	7275eu				2000	2100	vl	Solomon Islands, SIBC	5020do			
1900	2000		Swaziland, Trans World R	3200af					2000	2100	mtwhf	Spain, R Exterior Espana	9595af	9680eu		
1900	1930		Tanzania, Radio	5050af					2000	2100		Swaziland, Trans World R	3200af			
1900	2000		Thailand, Radio	9535eu	9655eu	11905eu			2000	2030		Switzerland, Swiss R Intl	9620af	11910af	13660af	13790af
1900	2000		Uganda, Radio	4976do					2000	2100		Uganda, Radio	4976do			
1900	2000		UK, BBC World Service	3255af	3955eu	6005af	6190af		2000	2100		UK, BBC World Service	3255af	3955eu	5975pa	6005af
				6195eu	9410eu	9630af	9740pa		2000	2100		6190af	6195eu	9630af	9740pa	11835af
				11980me	12095af	15400af	17830af		2000	2100		12095af	15400af			
1900	2000		UK, Merlin Network One	6010eu					2000	2100		USA, Armed Forces Network	4278am	6458am	12689am	
1900	2000		USA, Armed Forces Network	4278am	6458am	12689am			2000	2100	mtwhf	USA, KAIJ Dallas TX	13815va			
1900	2000		USA, KAIJ Dallas TX	13815va					2000	2100		USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1900	2000		USA, KJES Vado NM	15385na					2000	2100		USA, WGTG McCaysville GA	9400va	12172am		
1900	2000		USA, KTVN Salt Lake City UT	15590na					2000	2100		USA, WHRA Greenbush ME	17650af			
1900	2000		USA, KWHR Naalehu HI	9930as					2000	2100		USA, WHRI Noblesville IN	9495na	13760na		
1900	2000		USA, VOA Special English	9785me	12015me	13640me			2000	2100		USA, WINB Red Lion PA	13790eu			
1900	1930	as	USA, Voice of America	4950af					2000	2100		USA, WJCR Upton KY	7490na	13595na		
1900	2000		USA, Voice of America	6035af	7415af	9525pa	9760af		2000	2100		USA, WRNO New Orleans LA	7395na	15420va		
				11870pa	11920af	11975af	13710af		2000	2100		USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af	
				15180pa	15240af	15580af			2000	2100		USA, WTJC Newport NC	9370na			
1900	2000	mtwhf	USA, Voice of America	5965me	9840as	11720me	11970as		2000	2100		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
				13725me	15205me	15410as			2000	2100		USA, WYFR Okeechobee FL	7355eu	15565af	21525af	
				9340na					2000	2100	vl	Vanuatu, Radio	4960do			
1900	2000	mtwhf	USA, WBCQ Monticello ME	9340na					2000	2030		Vatican City, Vatican R	9660af	11625af	13765af	
1900	2000		USA, WEWN Birmingham AL	11875na	13615na	15745eu			2000	2027		Vietnam, Voice of	9730eu			
1900	2000		USA, WGTG McCaysville GA	9400va	12172am				2000	2100		Zambia, Christian Voice	4965do			
1900	2000		USA, WHRA Greenbush ME	17650af					2000	2100	vl	Zimbabwe, Zimbabwe BC	4828do			
1900	2000		USA, WHRI Noblesville IN	9495sa	13760na				2005	2010		Croatia, Croatian Radio	13830eu			
1900	2000		USA, WINB Red Lion PA	13800eu					2005	2010		Syria, Radio Damascus	12085eu	13610eu		
1900	2000		USA, WJCR Upton KY	7490na	13595na				2015	2100	vl	Libya, Voice of Africa	15235va	15415va	15435va	
1900	2000		USA, WRNO New Orleans LA	7395na	15420va				2025	2045		Italy, RAI Intl	7220af	9710af	11880af	
1900	2000		USA, WSHB Cypress Crk SC	15665eu	18915af				2030	2100		Cuba, Radio Havana	13660eu	13715eu	13750eu	
1900	2000		USA, WTJC Newport NC	9370na					2030	2100		Egypt, Radio Cairo	15375af			
1900	2000		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na		2030	2100		Georgia, Georgian Radio	11760eu			
1900	2000		USA, WYFR Okeechobee FL	11565eu					2030	2100		Germany, AWR Europe	9640af			
1900	2000	vl	Vanuatu, Radio	4960do					2030	2100		S Africa, AWR Africa	9745af			
1900	1927		Vietnam, Voice of	7145eu	9730eu				2030	2100		Serbia, Radio Yugoslavia	6100eu			
1900	2000		Zambia, Christian Voice	4965do					2030	2100		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1900	2000	vl	Zimbabwe, Zimbabwe BC	4828do					2030	2100		Sweden, Radio	6065eu			
1930	1956		Belgium, R Vlaanderen Intl	5910eu	9925eu	13600eu	17695af		2030	2045		Thailand, Radio	9535eu	9655eu	11905eu	
1930	2000		Georgia, Georgian Radio	11910eu					2030	2100		Turkey, Voice of	9630eu	9895eu		
1930	2000		Iran, VOIRI	7215eu	9022eu	9880as			2030	2100	as	USA, Voice of America	4950af			
1935	1955		Italy, RAI Intl	5970eu	7285eu	9760eu			2030	2057		Vietnam, Voice of	7145eu			
1956	2000		S Africa, Voice of Hope	6290af					2045	2100		India, All India Radio	7150au	7410eu	9650eu	9910au
									2055	2100	mtwhfa	9950eu	11620va	11715au		
												Armenia, Voice of	4810eu	9965eu		

FREQUENCIES

2100	2200		Anguilla, Caribbean Beacon	11775am			
2100	2115	mtwhf	Armenia, Voice of	4810eu	9965eu		
2100	2130	vl	Australia, ABC/Alice Springs	2310do			
2100	2130	vl	Australia, ABC/Katherine	2485do			
2100	2200	vl	Australia, ABC/Katherine	5025do			
2100	2130	vl	Australia, ABC/Tennant Creek	2325do			
2100	2130		Australia, Radio	7240as	9500as	9580as	9660as
				11880as	12080as	21740as	
2100	2200	vl	Botswana, Radio	3356do	4820do		
2100	2200		Bulgaria, Radio	5845eu	7535eu		
2100	2200	vl	Canada, CBC N Quebec Svc	9625do			
2100	2200		Canada, CFRX Toronto	6070do			
2100	2200		Canada, CFVP Calgary	6030do			
2100	2200		Canada, CHNX Halifax	6130do			
2100	2200		Canada, CKZN St John's	6160do			
2100	2200		Canada, CKZU Vancouver	6160do			
2100	2200		Canada, Radio Canada Intl	5995va	7235va	9770va	9805va
				11945va	13650va	13690va	15325va
				17820va			
2100	2200		Costa Rica, RF Peace Intl	15050va	25930va		
2100	2130		Cuba, Radio Havana	13750eu			
2100	2127		Czech Rep, R Prague Intl	5930na	9430as		
2100	2200		Ecuador, HCJB	17660eu	21455va		
2100	2115		Egypt, Radio Cairo	15375af			
2100	2200		Eqt Guinea, Radio Africa	15186af			
2100	2145		Germany, Deutsche Welle	9615af	9690af	9765as	15135as
				15410va	17560as		
2100	2130		Hungary, Radio Budapest	6025eu	7165eu		
2100	2200		India, All India Radio	7150va	7410eu	9650eu	9910au
				9950eu	11620va	11715au	
2100	2200	irreg	Iraq, Radio Iraq Intl	9685va	11787va		
2100	2130		Israel, Kol Israel	7150va	9395va	9435va	11605va
				15640af	15650va		
2100	2200	vl	Italy, IRRS	3985va			
2100	2200		Japan, Radio/NHK	6035pa	9725eu	11850pa	17825va
2100	2130		Kenya, Kenya BC Corp	4885do	4935do		
2100	2130		Kiribati, Radio	9810do			
2100	2200	vl	Lesotho, Radio	4800do			
2100	2115		Liberia, LCN/R Liberia Int	5000do			
2100	2200	vl	Malawi, MBC	3380do			
2100	2200		Malaysia, Radio	7295do			
2100	2200	mtwhf	Malta, V of Mediterranean	7440eu			
2100	2200		Namibia, NBC	3270af	3289af		
2100	2200		New Zealand, R NZ Intl	17675va			
2100	2200	vl	Nigeria, Radio/Enugu	6025do			
2100	2200	vl	Nigeria, Radio/Ibadan	6050do			
2100	2200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2100	2200	vl	Nigeria, Radio/Lagos	3326do	4990do		
2100	2200		Palau, KHBH/Voice of Hope	9985as			
2100	2200	vl	Papua New Guinea, NBC	9675do			
2100	2156		Romania, R Romania Intl	5955eu	7195eu	7215eu	9690eu
2100	2200		Russia, Voice of Russia WS	5940eu	5965eu	6205eu	7320eu
				7340eu	9480eu	9890eu	
2100	2200		Sierra Leone, SLBS	3316do			
2100	2200	vl	Solomon Islands, SIBC	5020do			
2100	2130		South Korea, R Korea Intl	6480eu	15575eu		
2100	2200		Swaziland, Trans World R	3200af			
2100	2130		Switzerland, Swiss R Intl	6165eu			
2100	2105		Syria, Radio Damascus	12085eu	13610eu		
2100	2130		Turkey, Voice of	9630eu	9895eu		
2100	2200		UK, BBC World Service	3255af	3915as	3955eu	5965as
				5975va	6005af	6180eu	6190af
				6195va	9410pa	9740pa	11835af
				12095sa	15400af		
2100	2200		USA, Armed Forces Network	4278am	6458am	12689am	
2100	2200		USA, KAIJ Dallas TX	13815va			
2100	2200		USA, KTBN Salt Lake City UT	15590na			
2100	2200		USA, KWHR Naalehu HI	17510as			
2100	2200		USA, Voice of America	6035af	6040me	6095as	7415af
				9595as	9760as	11870pa	11975af
				13710af	15185pa	15240af	15580af
				17725af	17735as	17820as	
2100	2200		USA, WBCQ Monticello ME	7415na			
2100	2200	mtwhf	USA, WBCQ Monticello ME	9340na			
2100	2200		USA, WEWN Birmingham AL	9975eu	11875na	13615na	
2100	2200		USA, WGTG McCaysville GA	9400va	12172am		
2100	2200		USA, WHRA Greenbush ME	17650af			
2100	2200		USA, WHRI Noblesville IN	5745na	9495sa		
2100	2200		USA, WINB Red Lion PA	13790eu			
2100	2200		USA, WJCR Upton KY	7490na	13595na		
2100	2200	s	USA, WRMI/R Miami Intl	9955am			
2100	2200		USA, WRNO New Orleans LA	7395na	15420va		
2100	2200		USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af	
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	7435na	9475na	12160na	13845na
2100	2200		USA, WYFR Okeechobee FL	7355eu	11565eu	15565af	21525af
2100	2200	vl	Vanuatu, Radio	4960do			
2100	2200		Zambia, Christian Voice	4965do			
2100	2200	vl	Zimbabwe, Zimbabwe BC	4828do			
2110	2200	s	Greece, Voice of	9425au	11645au		
2110	2200		Syria, Radio Damascus	12085na	13610na		
2115	2200		Egypt, Radio Cairo	9990eu	15375af		
2115	2130	mtwhf	UK, BBC Caribbean Report	5975am		15390am	
2115	2130	as	UK, BBC World Service	5975na			
2130	2200	vl	Australia, ABC/Tennant Creek	4910do			
2130	2200		Australia, Radio	7240as	9660as	11880as	12080as
				15415as	17580as	21740as	
2130	2200	th	Belarus, Radio Minsk	7105eu	7210eu		
2130	2156		China, China Radio Intl	5965eu	7590eu	9535eu	13675af
				15500af			

2130	2200		Guam, AWR/KSDA	9495as	11985as		
2130	2200		Iran, VOIRI	11740as	13720as	13745as	
2130	2200		Poland, Radio Polonia	6035eu	6095eu	7285eu	9525eu
2130	2200		South Korea, R Korea Intl	15575eu			
2130	2145	f	UK, BBC Calling Falklands	11680sa			
2130	2200		UK, Merlin Network One	6010eu			
2130	2200		USA, Voice of America	6035af	7415af	11975af	13710af
		smtwhf		15240af	15580af	17725af	
2130	2200		Uzbekistan, R Tashkent	7105eu	9540eu		
2145	2200	mtwhf	USA, WRMI/R Miami Intl	7385na			
2150	2200		Vatican City, Vatican R	4005eu	5883eu	7250eu	

2200 UTC

2200	2300		Anguilla, Caribbean Beacon	6090am			
2200	2300	vl	Australia, ABC/Katherine	5025do			
2200	2300	vl	Australia, ABC/Tennant Creek	4910do			
2200	2300		Australia, Radio	9660as	12080as	15415as	17580as
				17705as	17795as	21740as	
2200	2300		Canada, CBC N Quebec Svc	9625do			
2200	2300		Canada, CFRX Toronto	6070do			
2200	2300		Canada, CFVP Calgary	6030do			
2200	2300		Canada, CHNX Halifax	6130do			
2200	2300		Canada, CKZN St John's	6160do			
2200	2300		Canada, CKZU Vancouver	6160do			
2200	2259		Canada, Radio Canada Intl	5995va	7235va	9805va	11705as
				13690va	15325va		
2200	2256		China, China Radio Intl	7170eu			
2200	2300		Costa Rica, RF Peace Intl	15050va	25930va		
2200	2245		Egypt, Radio Cairo	9990eu			
2200	2300		Eqt Guinea, Radio Africa	15186af			
2200	2300		Germany, Overcomer Ministries	7285sa			
2200	2300		Ghana, Ghana BC Corp	4915do			
2200	2210	s	Greece, Voice of	9425au	11645au		
2200	2230	s	India, All India Radio	7150va	7410eu	9650eu	9910au
				9950eu	11620va	11715au	
2200	2230		Iran, VOIRI	11740as	13720as	13745as	
2200	2300	vl	Italy, IRRS	3985va			
2200	2225		Italy, RAI Intl	9675as	11900as		
2200	2215		Liberia, LCN/R Liberia Int	5100do			
2200	2210	vl	Malawi, MBC	3380do			
2200	2300		Malaysia, Radio	7295do			
2200	2300		Namibia, NBC	3270af	3289af		
2200	2300		New Zealand, R NZ Intl	17675va			
2200	2300	vl	Nigeria, Radio/Enugu	6025do			
2200	2300	vl	Nigeria, Radio/Ibadan	6050do			
2200	2300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2200	2300	vl	Nigeria, Radio/Lagos	3326do	4990do		
2200	2300		Palau, KHBH/Voice of Hope	9955as	9965as	9985as	
2200	2300	vl	Papua New Guinea, NBC	9675do			
2200	2215		Poland, Radio Polonia	6035eu	6095eu	7285eu	9525eu
2200	2300		Russia, Voice of Russia WS	5940eu	5965eu	6205eu	7300eu
				7320eu	7340eu	9890eu	
2200	2300		Sierra Leone, SLBS	3316do			
2200	2300	vl	Solomon Islands, SIBC	5020do			
2200	2230		South Korea, R Korea Intl	3980eu			
2200	2210		Syria, Radio Damascus	12085na	13610na		
2200	2300		Taiwan, Radio Taiwan Intl	5810eu	9355eu		
2200	2300		UK, BBC World Service	3955eu	5965as	5975na	6175na
				6195va	7110as	9590na	9660as
				9915eu	11835af	11955as	12080pa
				12095sa	15400af		
2200	2300	f	UK, Merlin Network One	6170eu	7165eu	9615eu	
2200	2300		USA, Armed Forces Network	4278am	6458am	12689am	
2200	2300		USA, KAIJ Dallas TX	13815va			
2200	2300		USA, KTBN Salt Lake City UT	15590na			
2200	2300		USA, KWHR Naalehu HI	17510as			
2200	2230		USA, Voice of America	7215as	9770as	9890as	11760as
				15185as	15290as	17735pa	17820as
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
				13710af			
2200	2300		USA, WBCQ Monticello ME	7415na			
2200	2300		USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2200	2300		USA, WGTG McCaysville GA	9400va	12172am		
2200	2300		USA, WHRA Greenbush ME	17650af			
2200	2300		USA, WHRI Noblesville IN	5745na	9495sa		
2200	2300		USA, WINB Red Lion PA	13790eu			
2200	2300		USA, WJCR Upton KY	7490na	13595na		
2200	2300	mtwhf	USA, WRMI/R Miami Intl	9955am			
2200	2300	a	USA, WRMI/R Miami Intl	9955am			
2200	2300		USA, WRNO New Orleans LA	7395na	15420va		
2200	2300		USA, WSHB Cypress Crk SC	7510eu	13770eu	15285sa	
2200	2300		USA, WTJC Newport NC	9370na			
2200	2300		USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200	2300		USA, WYFR Okeechobee FL	11740na	15565af	21525af	
2200	2300	vl	Vanuatu, Radio	4960do			
2200	2210		Vatican City, Vatican R	4005eu	5883eu	7250eu	
2205	2210		Croatia, Croatian Radio	9405af			
2205	2300	as	Spain, R Exterior Espana	9595af	9680eu		
2230	2300		Austria, Radio Austria Intl	5945eu	6155eu	13730af	
2230	2300	th	Belarus, Radio Minsk	7105eu	7210eu		
2230	2300		Cuba, Radio Havana	9550am			
2230	2257		Czech Rep, R Prague Intl	7345na	9435af		
2230	2255		Moldova, R Moldova Intl	7520eu			
2230	2300		Sweden, Radio	6065eu	7325eu		
2230	2300		Turkey, Voice of	9525as			
2245	2300		India, All India Radio	7410as	9705as	9950as	11620as
				13625as			
2245	2300		Vatican City, Vatican R	7305as	9600au	11830au	

2300	0000	UK, Merlin Network One	3975eu			
2300	0000	Ukraine, Radio Ukraine Intl	4820eu	5905eu	6020eu	6030va
			6080eu	7205eu	7420eu	9560eu
			9610eu	9785na	9810va	
2300	0000	USA, Armed Forces Network	4278am	6458am	12689am	
2300	0000	USA, KAIJ Dallas TX	13815va			
2300	0000	USA, KTBN Salt Lake City UT	15590na			
2300	0000	USA, KWHR Naalehu HI	17510as			
2300	0000	USA, VOA Special English	6045as	7140as	9545as	11925as
			15395as			
2300	0000	USA, Voice of America	7215as	9770as	9890as	11760as
			15185as	15290as	17735as	17820as
2300	0000	USA, WBCQ Monticello ME	7415na			
2300	0000	USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2300	0000	USA, WGTG McCalysville GA	5085va	6890am		
2300	0000	USA, WHRA Greenbush ME	7580af			
2300	0000	USA, WHRI Noblesville IN	5745na	9495sa		
2300	0000	USA, WINB Red Lion PA	11950am			
2300	0000	USA, WJCR Upton KY	7490na	13595na		
2300	0000	a USA, WRMI/R Miami Intl	9955am			
2300	0000	USA, WRNO New Orleans LA	7355na			
2300	0000	USA, WSHB Cypress Crk SC	7510va	13770eu	15285sa	
2300	0000	USA, WTJC Newport NC	9370na			
2300	0000	USA, WWCN Nashville TN	3215na	5070na	7435na	13845na
2300	0000	USA, WYFR Okeechobee FL	11740na			
2300	0000	vi Vanuatu, Radio	4960do			
2300	2315	Vatican City, Vatican R	7305au	9600au	11830au	
2315	0000	vl Libya, Voice of Africa	15235va	15415va	15435va	
2330	0000	Albania, R Tirana Intl	7130eu	9540eu		
2330	2356	Belgium, R Vlaanderen Intl	13670na			
2330	0000	Canada, Radio Canada Intl	5960na	9755na		
2330	0000	Canada, Radio Canada Intl	6040na	9535am	11865am	
2330	2357	Czech Rep, R Prague Intl	7345na	9435na		
2330	0000	Guatemala, Radio Cultural	3300do			
2330	0000	Hungary, Radio Budapest	3975eu			
2330	0000	Malaysia, RTM Sarawak	7160do			
2330	0000	Netherlands, Radio	6165na	9845na		
2330	0000	USA, VOA Special English	6045as	7130as	7140as	9535as
			9545as	11805as	11925as	15205as
			15395as			
2330	2357	Vietnam, Voice of	7145as	12020as		

How To Use This Table

The *Monitoring Times* propagation table is set up to cover three main areas of the continental US and similar circuits are calculated for each area. If you live in Canada or along the 49th parallel, and have access to the Internet, you can check the following sites for similar tables for the Canadian and northern US users at <http://www.odxa.on.ca/rac2txt99.htm>.

In the *MT* tables and on the Canadian web site, the OWF (Optimum Working Frequency) frequency for a particular circuit is displayed. This frequency should give you the best chance, 90% of the time, to hear a station located at the other end of the circuit. If you feel adventurous, look up higher than the OWF for possible signals.

The tabulated OWF is approximately equivalent to 80% of the MUF (Maximum Usable Frequency) so you could still go up in frequency in your search for a signal. For example, if the tabulated OWF is 8.0 MHz, the MUF would be 10 MHz, so you could go lurking in the upper reaches up to 10 MHz. When you reach the MUF, your chances of hearing a good signal have now decreased to about 10%. When the solar activity is high you might find some of the MUF in the 35 to 45 MHz area; you never know what you can find "up there."

The OWF can, at times, have a calculated value of "0". This value is replaced by an asterisk (*) and the cells are shaded in the *Monitoring Times* chart and on the Web pages. When you see this, do not despair; keep on looking in the vicinity of the last frequency listed for that circuit. The reason why the OWF can have a calculated value of "0" is simply that the ALF (Absorption Frequency) on this circuit, at that particular time of day, is higher than the OWF and, in theory, communication at the OWF should be impossible. But I have been in the radio field long enough to know that theory and practice do not always agree!

As it is relatively safe to assume reciprocity in the forecasts most of the time, the *MT* circuits are labeled "TO/FROM."

There are some technical arguments against this assumption, but we know that the *MT* forecasts have been used with success by overseas listeners to listen to North American broadcasts.

A "P" after the name of a circuit indicates that the signal on that particular circuit can be influenced by auroral zone disturbances while traveling over the pole.

Enjoy DXing and use the propagation charts to help you locate unusual signals.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 April 2000 to 14 May 2000 Flux=194 SSN=151

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
CARIBBEAN	19	19	18	17	16	14	12	12	12	11	11	11	11	13	14	16	17	18	18	19	18	18	18	18
SOUTH AMERICA	19	20	21	21	19	17	16	15	15	14	13	13	13	16	20	21	22	22	23	23	24	23	23	21
WESTERN EUROPE	12	12	11	10	10	11	12	11	*	*	*	*	*	*	14	16	17	17	18	18	17	16	15	14
EASTERN EUROPE (P)	12	12	12	12	13	14	14	*	*	*	*	*	*	*	14	15	16	17	17	17	16	15	*	*
NORTH AFRICA	19	17	17	16	16	16	14	13	*	*	*	*	*	*	16	17	18	18	19	19	20	19	19	19
CENTRAL AFRICA	19	20	20	19	18	16	13	13	*	*	*	*	*	*	17	18	20	21	21	21	21	21	20	19
SOUTH AFRICA	20	20	16	13	11	15	14	14	13	*	*	*	*	*	15	17	19	20	21	22	22	21	21	20
MIDDLE EAST (P)	16	16	17	20	19	17	15	*	*	*	*	*	*	*	15	17	19	20	20	20	19	19	18	17
CENTRAL ASIA (P)	19	20	20	21	20	18	16	14	*	*	*	*	*	11	12	13	15	16	17	17	17	16	15	16
INDIA (P)	19	19	20	20	20	19	17	*	*	*	*	*	*	10	11	12	15	17	19	20	21	20	18	17
THAILAND	20	20	20	21	21	20	18	16	14	13	12	12	11	11	12	14	17	19	20	21	20	18	18	20
AUSTRALIA	24	24	24	25	25	22	20	18	16	15	15	14	13	13	13	16	17	15	*	*	*	16	22	24
CHINA	20	20	20	21	21	19	18	16	14	12	12	11	11	11	12	14	16	16	16	15	15	16	18	20
JAPAN	19	19	19	19	19	18	16	14	13	12	11	11	10	10	11	13	15	14	13	15	18	19	19	19
SOUTH PACIFIC	22	22	22	23	22	19	17	16	15	14	14	12	11	11	12	15	14	17	21	21	22	23	23	23
TO/FROM US MIDWEST																								
CARIBBEAN	20	20	18	17	15	14	14	14	13	12	11	12	15	18	20	20	21	21	21	21	21	20	20	20
SOUTH AMERICA	23	24	23	22	21	20	19	19	17	16	15	16	20	24	25	26	26	26	27	27	26	26	26	24
WESTERN EUROPE	14	13	13	12	12	12	13	12	11	*	*	*	15	16	17	18	18	18	18	19	19	18	17	16
EASTERN EUROPE (P)	12	11	11	12	13	13	12	*	*	*	*	*	13	15	17	18	19	20	19	18	17	15	13	13
NORTH AFRICA	18	18	17	16	15	14	13	*	*	*	*	*	15	16	17	18	18	19	19	19	19	19	19	19
CENTRAL AFRICA	23	22	21	19	17	15	14	13	*	*	*	15	16	17	18	19	20	20	21	21	21	21	21	22
SOUTH AFRICA	23	19	15	13	10	14	16	15	14	*	*	15	17	18	20	21	22	22	22	22	21	21	21	22
MIDDLE EAST	16	16	17	18	16	14	13	*	*	*	*	*	14	16	17	18	19	19	19	19	19	19	19	17
CENTRAL ASIA (P)	18	19	19	18	17	15	*	*	*	*	*	*	14	15	16	17	18	18	18	18	17	15	15	15
INDIA	19	19	19	18	17	15	*	*	*	*	*	*	13	15	17	19	20	20	21	21	21	19	17	17
THAILAND	19	20	20	19	18	16	*	*	*	*	*	11	12	13	16	18	19	20	21	21	20	18	17	19
AUSTRALIA	22	22	23	22	20	18	16	15	14	14	13	13	12	13	15	17	17	15	*	*	*	16	21	22
CHINA (P)	20	20	20	19	18	16	*	*	*	*	11	11	12	14	16	17	17	17	17	16	15	16	18	19
JAPAN	19	19	20	20	18	16	14	13	12	11	11	10	11	12	14	15	15	15	14	16	18	19	19	19
SOUTH PACIFIC	23	23	24	23	19	18	16	15	15	15	13	13	12	14	18	16	16	20	23	23	24	24	24	23
TO/FROM US EAST COAST																								
CARIBBEAN	15	14	13	12	12	11	11	10	9	8	9	11	13	15	15	15	16	16	16	16	15	15	15	15
SOUTH AMERICA	22	22	22	21	21	20	20	18	16	14	15	19	23	25	25	25	25	25	24	24	24	24	23	22
WESTERN EUROPE	14	14	13	12	12	12	13	12	12	12	14	16	17	18	18	18	18	18	19	20	20	19	18	16
EASTERN EUROPE	12	12	11	11	12	13	12	11	*	*	*	14	16	17	18	19	19	19	19	19	17	15	14	13
NORTH AFRICA	18	17	18	16	15	15	14	13	*	*	14	16	17	18	19	20	21	20	20	20	20	20	19	18
CENTRAL AFRICA	23	22	19	18	17	16	15	14	14	14	17	18	20	20	21	21	21	21	22	23	22	22	23	23
SOUTH AFRICA	22	18	15	12	10	14	17	15	14	15	18	22	23	25	24	24	25	25	25	24	24	23	24	24
MIDDLE EAST	17	16	16	17	15	14	13	*	*	*	15	16	17	18	19	20	20	20	21	21	20	20	19	18
CENTRAL ASIA (P)	17	19	19	17	15	14	*	*	*	*	14	15	17	18	19	19	20	19	18	18	17	16	15	15
INDIA (P)	18	20	19	16	14	*	*	*	*	*	15	17	19	20	21	21	21	21	21	21	20	19	17	17
THAILAND (P)	21	20	19	17	15	*	*	*	*	*	14	16	18	19	20	21	21	21	21	21	20	18	17	19
AUSTRALIA	23	23	22	20	18	16	15	15	15	14	13	13	15	17	19	18	17	15	*	*	*	17	22	22
CHINA (P)	20	20	19	17	15	*	*	*	*	*	12	13	16	18	19	20	18	18	17	16	14	14	17	19
JAPAN	21	21	20	19	17	15	14	13	12	12	12	13	14	16	17	17	16	16	15	16	18	20	20	20
SOUTH PACIFIC	25	25	23	21	19	18	17	17	17	16	14	14	17	21	20	17	18	24	26	26	26	26	25	25

* Unfavorable conditions: Search around the last listed frequency for activity.
(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

Don't Overlook These Gems!

In navigating the cornucopia that is shortwave radio, it's rather easy to unknowingly tune right past programs that may deserve to be ranked with the best the medium has to offer. I've been listening to a lot of radio for a lot of years. Of course, like everyone else I have my biases. Nonetheless, I think you'll find something enjoyable among the following encapsulated reviews.

Studio Nine

HCJB, Quito, Ecuador
Tue.-Sat. 0110, 0410 UT

If you don't speak Spanish, there isn't much of anything – unfortunately even on shortwave – that focuses on the forgotten continent in this hemisphere. That's what makes **Studio Nine** such a unique and valuable program. For twenty minutes every weeknight, the Voice of the Andes puts the spotlight on different aspects of Latin America and its people. Tuesday, it's health and medicine in the region; Wednesday – history and heritage; Thursday – the environment; Friday – business matters; and Saturday, travel and tourism.

Over the course of the week; between **Studio Nine** and the newscast that precedes it at the top of the hour, you can get a pretty comprehensive picture of life in Latin America. The reports and features are nicely produced and introduced by Jim Wilbar. The format also is flexible enough to permit HCJB to temporarily dispense with the format and provide coverage of breaking news, as the station did to provide ongoing eyewitness reports during Ecuador's coup in January.

Capital Cafe

YLE Radio Finland
Sun. 0200* UT

For the most part, civil conversation is something that disappeared from American radio some time ago. So for us, **Capital Cafe** might be considered either an old-fashioned throwback of sorts or a refreshing change from the ordinary. I choose the latter. You can almost smell the coffee and see out the window on Helsinki while listening to these interesting local personalities of note discuss their lives, work and ideas.

A fitting testament to this program is that I've almost never heard of the people featured on this program, but I never fail to be drawn into the conversation. This is such an interesting way to learn about the Finns and Finland that it is surprising that more stations haven't emulated the format. Indeed, the half hour always seems to end much too soon – usually right after I've poured myself another cup!

(*YLE has had a recent pattern of shifting its daily North America transmission to local mornings during the summer. If this pattern holds, this program may be broadcast Sun. at 1330 instead.)

The Planet

Radio Australia
Mon.-Fri. 1315 UT



After 40+ years of listening to music, you get tired of hearing the same old things. This program is, in no way, the same old thing. In fact, it may just be the best music program on radio anywhere. You will hear things on **The Planet** that you would never hear on the air anywhere else; and it's all good stuff. If you're already a fan of Andy Kershaw and John Peel, **The Planet** will only add to your pleasure. The program's web site <www.abc.net.au/rn/music/planet/planet.htm> says it best, so we'll let it.

"Good players don't put music into little boxes, so we don't either. You'll hear jazz, blues, folk styles, art music and more in a show artfully arranged for radio."

Your guide is Lucky Oceans, born Reuben Gosfield in Philadelphia, who's a founding member of the legendary western swing band, Asleep At The Wheel. He played pedal-steel with the group for most of the 70s during which they were nominated for six Grammys – winning one for Best Country Instrumental in 1978, and another in 1993. Listen to this program. You can thank me later.

In Touch with Stockholm

Radio Sweden

Sun. 1130, 1330; Mon. 0230, 0330 UT
(First Sun./Mon. of each month only)

The only bad thing about **In Touch with Stockholm** is that it just airs once a month. Many stations have programs that read listener mail. Some even answer questions. **In Touch...** goes another step. It puts listeners in direct contact on the air with Swedes that are experts on the topics those listeners have raised in their correspondence with the station. The listener is given the unique opportunity to discuss his or her interest with that expert, courtesy of Radio Sweden, and we all get to listen in to the conversation. It's an interesting way of ensuring that the

question is answered fully, to the complete satisfaction of the questioner. Nidia Hagstrom deftly moderates the discussions while answering other mail in the more conventional way, as well.

C'est La Vie

Radio Canada International
Fri. 2330

Since most shortwave listeners have a keener than average interest in what goes on in the world around them, most will have an awareness of the Anglo-Franco divide north of the U.S. border, especially in Quebec. However, that conflict is not all there is to know about French culture in America's neighbor to the north.

C'est La Vie fills the inevitable gaps that exist in our knowledge and awareness of what it means to be French on this continent. The richness of everyday life and the vibrancy of business, the arts and heritage in Quebec and French Canada are warmly and astutely placed on display every week in **C'est La Vie**. You think you know the neighborhood? This program will make you think again.

That's all there's room for this month. We'll do this again soon. Drop me a line and share *your* hidden treasures from the shortwave bands. Until May, good listening!

Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more!
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✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz.
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Kevin Carey

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Edited by John Figliozi

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WRN One English to North America

Astra Satellite on 19.2° East, Subcarrier 7.38 MHz, Transponder 22 (VH-1 TV) on 11.538 GHz vertical. You can reach the World Radio Network (WRN) by email at online@wrn.org or through their websites on the internet at www.wrn.org/ and www.euromixonline.com. Many programs can also be heard in Canada on CBC English Overnight. WRN is relayed 24 hours a day on many cable systems via the CSPAN Audio One Network. All times and days are in UTC. For Eastern Daylight Time subtract four hours.

UTC	Days	Station/Program
0000	Daily	Australia, Radio
0030	Daily	Sweden, Radio
0100	Su-Mo	National Public Radio - Weekend All Things Considered
	Tu-Sa	National Public Radio - All Things Considered
0200	Su-Mo	Canada (RCI) - News and Features
	Tu-Sa	Canada (CBC) - As It Happens
0300	Daily	Poland, Polish R Warsaw
0330	Su	S Africa, Channel Africa - Network Africa
	Mo-Fr	Hungary, Radio Budapest
	Sa	Denmark - Copenhagen Calling
0400	Su	S Africa, Channel Africa - Network Africa
	Mo	Denmark - Copenhagen Calling
	Tu-Sa	Public Radio International - Market Place
0430	Daily	Austria, Radio Austria Intl
0500	Daily	Switzerland, Swiss R Intl
0530	Sa-Su	Canada (RCI) - News and Features
	Mo-Fr	Canada (RCI) - First Edition
0600	Su-Mo	National Public Radio - Weekend All Things Considered
	Tu-Sa	National Public Radio - All Things Considered (repeat)
0700	Daily	Australia, Radio
0800	Su	Adventist World Radio
	Mo-Fr	Canada (RCI)
	Sa	Voice of America - Kim Elliott's Communications World
0900	Daily	Czech Rep, Radio Prague Intl
0930	Su	Greece, 2000 News Radio - News Athens
	Mo-Fr	Belgium, R Vlaanderen Intl
	Sa	Overnight Productions - This Way Out
0945	Su	UK, London Radio Service - Money Matters
1000	Su	Public Radio International - A Prairie Home Companion
	Mo-Fr	Switzerland, Swiss R Intl
	Sa	Public Radio International - This American Life
1030	Mo-Fr	S Africa, Channel Africa
1100	Su	Public Radio International - A Prairie Home Companion
	Mo-Fr	National Public Radio - Morning Edition
	Sa	National Public Radio - Fresh Air
1200	Sa-Su	National Public Radio - Weekend Edition
	Mo-Fr	National Public Radio - Morning Edition
1300	Daily	Radio France Internationale

1400	Su	New Zealand, Radio NZ Intl
	Mo-Fr	Israel, KOL Israel
	Sa	World Radio Network - Network Plus
1430	Su	Voice of America - Kim Elliott's Communications World
	Mo-Fr	S Africa, Channel Africa
	Sa	S Africa, Channel Africa - Network Africa
1500	Su	Radio Memphis
	Mo-Fr	Public Radio International - The Connection (live)
	Sa	National Public Radio - CarTalk (live)
1600	Su	Denmark - Copenhagen Calling
	Mo-Fr	Caribbean News Agency (CANA) - Caribbean Tempo
	Sa	Greece, 2000 News Radio - News Athens
1615	Mo-Fr	Vatican City, Vatican R - World News
	Sa	Denmark - Copenhagen Calling
1630	Daily	Austria, Radio Austria Intl
1700	Su	Overnight Productions - This Way Out
	Mo-Fr	Slovakia, R Slovakia Intl
	Sa	United Nations Radio - World in Review
1715	Sa	United Nations Radio - Scope
1730	Daily	Ireland, RTE Radio One
1800	Daily	Australia, Radio
1830	Daily	Belgium, R Vlaanderen Intl
1900	Daily	Finland, YLE/R Finland
1930	Daily	Sweden, Radio
2000	Daily	China, China Radio Intl
2030	Daily	Poland, Polish R Warsaw
2100	Daily	Voice of America - News Now
2200	Sa-Su	National Public Radio - All Things Considered
	Mo-Fr	Public Radio International - The World
2300	Daily	Hungary, Radio Budapest
2330	Daily	Switzerland, Swiss R Intl

European Radio Network EuroMix Multi-Lingual Programs for Europe

EuroMix (analog): Eutelsat Hot Bird at 13 degrees East using a dish of 60 to 90 cm in diameter. The frequency is 10.853 GHz, H-Pol and select audio subcarrier 7.74 MHz on CTV.

EuroMix (digital): HotBird-3, 13 degrees East, 12.475 GHz, Transponder 89, H-Pol (SR 27500, FEC 3/4). Select audio service 'EuroMix' from audio menu.

RealAudio: Live streams via www.euromixonline.com/audio.html.

UTC	Days	Station
0000	Su	London Radio Service (Russian)
	Mo-Sa	Poland, Polish R Warsaw (Polish)
0030	Daily	Czech Rep, Radio Prague Intl (Czech)
0100	Sa-Su	Finland, YLE/R Finland (Finnish)
	Mo-Fr	Bulgaria, Radio (Bulgarian)
0130	Daily	Sweden, Radio (Swedish)
0200	Daily	Russia, Voice of (Russian)

0300	Daily	Russia, Voice of (Russian)
0400	Sa-Su	Belgium, R Vlaanderen Intl (Dutch)
	Mo-Fr	Belgium, R Vlaanderen Intl (Afrikaans)
0500	Sa-Su	United Nations Radio (Russian/French)
	Mo-Fr	Turkey, Voice of (Turkish)
0545	Sa-Su	World Radio Network (English)
0600	Sa-Su	Switzerland, Swiss R Intl (English)
	Mo-Fr	Kosmos (Afrikaans)
0630	Sa-Su	Switzerland, Swiss R Intl (German)
0700	Daily	Belgium, R Vlaanderen Intl (Dutch)
0800	Daily	Hungary, Radio Budapest (German)
0830	Daily	Vatican City, Vatican R (German)
0900	Su	World Radio Network (English)
	Mo-Fr	Russia, Voice of (English)
	Sa	Greece, 2000 News Radio - News Athens (English)
0915	Su	Greece, 2000 News Radio - News Athens (English)
	Sa	World Radio Network (English)
0940	Daily	Austria, Radio Austria Intl (English)
1000	Daily	Switzerland, Swiss R Intl (German)
1030	Daily	Slovakia, R Slovakia Intl (German)
1100	Daily	Hungary, Radio Budapest (Hungarian)
1200	Daily	Czech Rep, Radio Prague Intl (English)
1230	Daily	Finland, YLE/R Finland (Finnish)
1300	Sa-Su	Belgium, R Vlaanderen Intl (Dutch)
	Mo-Fr	Turkey, Voice of (Turkish)

1400	Sa-Su	Slovakia, R Slovakia Intl (Slovak)
	Mo-Fr	Slovakia, R Slovakia Intl (Bulgarian)
1430	Daily	Austria, Radio Austria Intl (Spanish)
1500	Daily	Sweden, Radio (Swedish)
1530	Daily	Czech Rep, Radio Prague Intl (Czech)
1600	Daily	Finland, YLE/R Finland (Swedish)
1630	Mo-Sa	Poland, Polish R Warsaw (Polish)
	Su	London Radio Service (Russian)
1700	Sa-Su	United Nations Radio (Russian/French)
	Mo-Fr	Vatican City, Vatican R (Portugese)
1755	Daily	British Broadcasting Corp. (Somali)
1830	Daily	Radio Studio Delta (Italian) (until 2130)
2130	Daily	Slovakia, R Slovakia Intl (Slovak)
2200	Daily	Belgium, R Vlaanderen Intl (Dutch)
2300	Daily	Hungary, Radio Budapest (Hungarian)

European Radio Network

EuroMax German to Europe

EuroMax (analog): Astra 1B, 19° Ost, Transponder 27 (MTV Deutsch), 11.612 GHz, horizontal, Audio Tonunterträger 7.38 MHz, all programs in German.

RealAudio: Live streams via www.euromaxonline.com/audio.html.

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SATELLITE RADIO GUIDE



Single Channel Per Carrier (SCPC) Services

By Robert Smathers, roberts@nmia.com

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3)	NASA space shuttle audio (missions only)
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Galaxy 4R Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA—Radio Korea
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY—Spanish religious programming and music, ID—Radio Vision Christiana de Internacional

Galaxy 4R Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo—news and talk
1404.60 (55.4)	WGN-AM (720) Chicago, IL—news and talk radio
1404.40 (55.6)	WMVP-AM (1000) Chicago, IL—"ESPN Radio 1000"/Bulls NBA radio network
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network
1402.90 (57.1)	USA Radio Network
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN—news and talk
1402.20 (57.8)	NorthWest Ag News Network - Agriculture info for the Pacific Northwest
1402.00 (58.0)	Occasional Audio
1401.80 (58.2)	People's Radio Network
1401.50 (58.5)	Agrinet Ag info/USA Radio Network
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend
1398.80 (61.2)	Talk Radio Network (TRN)
1398.50 (61.5)	Occasional audio/Nuggets NBA radio network
1398.30 (61.7)	WSB-AM (750) Atlanta, GA— news/talk/Hawks NBA radio network
1397.80 (62.2)	Occasional audio/Avalanche NHL radio network
1397.50 (62.5)	Minnesota Talking Book Radio Network—reading service for the blind
1397.10 (62.9)	Wisconsin Radio Network
1396.70 (63.3)	Radio America Network
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI—talk radio/Bucks NBA radio network
1395.40 (64.6)	Michigan News Network—network news feeds/WPLT-FM (96.3) Detroit
1395.00 (65.0)	Occasional audio
1394.70 (65.3)	WJR-AM (760) Detroit, MI—news and talk

1394.30 (65.7)	radio/Michigan News Network
1384.40 (75.6)	Michigan News Network – network news feeds
1384.20 (75.8)	KOA-AM (850)/KTLK-AM (760) Denver, CO—news and talk radio
1383.10 (76.9)	WSB-AM (750) Atlanta, GA – news/talk/Hawks NBA radio network
1382.60 (77.4)	KIRO-AM (710) Seattle, WA—news and talk radio
1382.30 (77.7)	Soldiers Radio Satellite (SRS) network—U.S. Army information and entertainment radio
1382.00 (78.0)	Motor Racing Network (occasional audio) NASCAR racing
1381.60 (78.4)	Occasional audio
1381.40 (78.6)	KEX-AM (1190) Portland, OR—news and talk radio/Trailblazers NBA radio network
1381.20 (78.8)	Occasional audio
1380.90 (79.1)	KJR-AM (950) Seattle, WA— sports talk radio/Supersonics NBA radio network
1377.10 (82.9)	Occasional audio
1376.00 (84.0)	In-Touch—reading service
	Kansas Audio Reader Network—reading service

Galaxy 4R Transponder 6 (C-band)

1347.00 (53.0)	WCRP-FM Guayama, Puerto Rico
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Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Quebec) service
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Anik E2 Transponder 5-Horizontal (C-band)

1366.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Eastern Arctic) service
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Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (66.0)	Canadian Broadcasting Corporation (CBC) Radio—North (MacKenzie) service
1325.50 (65.5)	Canadian Broadcasting Corporation (CBC) Radio—Occasional feeds/events

Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio—North (Western Arctic) service
1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio—North (Newfoundland and Labrador) service

Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0)	Societe Radio-Canada (SRC) Radio—AM Network
1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio—North (Yukon) service

Solidaridad 1 Transponder 1-Vertical (C-band)

1447.90 (52.1)	Antenna Radio/Antenna Radio Noticias
1447.60 (52.4)	Antenna Radio/Antenna Radio Noticias
1447.20 (52.8)	La Grande Cadena Raza

Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3)	Wal-Mart In-store music
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SATELLITE RADIO GUIDE



1037.00 (63.0)	Wal-Mart In-store music
1037.50 (62.5)	Wal-Mart In-store music

SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4)	Wal-Mart in-store network
1013.20 (80.8)	Wal-Mart in-store network
1012.80 (81.2)	Sam's Wholesale Club in-store network
1004.50 (89.5)	Wal-Mart in-store network
1004.00 (90.0)	Wal-Mart in-store network
1003.60 (90.4)	Sam's Wholesale Club in-store network
1003.20 (90.8)	Wal-Mart in-store network

RCA C5 Transponder 3-Vertical (C-band)

1404.60 (55.4)	Wyoming News Network-network news feeds
1400.60 (59.4)	Learfield Communications
1400.40 (59.6)	Learfield Communications/MissouriNet
1400.20 (59.8)	Learfield Communications
1400.00 (60.0)	Learfield Communications
1396.60 (63.4)	Kansas Information Network/Kansas Agnet-network news feeds
1396.40 (63.6)	Liberty Works Radio Network
1396.20 (63.8)	MissouriNet
1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network
1395.70 (64.3)	MissouriNet
1386.40 (73.6)	Learfield Communications
1386.20 (73.8)	Radio Iowa
1384.60 (75.4)	Capitol Radio Network
1384.00 (76.0)	Capitol Radio Network
1383.80 (76.2)	Learfield Communications
1383.40 (76.6)	Capitol Radio Network
1382.90 (77.1)	MissouriNet
1382.50 (77.5)	Virginia News Network-network news feeds/
1382.10 (77.9)	Learfield Communications/MissouriNet/Blues NHL radio network

SATELLITE LOADING REPORT OF THE MONTH

GE-3 at 87 degrees West longitude

C-band

Tr	Service
1	Associated Press TV (Digital)/ Data Transmissions
2	Data Transmissions
3	Data Transmissions
4	American Independent Network (AIN) (Digital)
5	Univision [VC2+]
6	Midwest Sports Channel (Digital)/ Home Team Sports (Digital)
7	Data Transmissions
8	Data Transmissions
9	WPIX-TV New York [VC2+]
10	Data Transmissions
11	CNN/SI
12	Data Transmissions
13	SCPC/FM Squared Services
14	Turner Classic Movies [VC2+]
15	KTLA-TV Los Angeles [VC2+]
16	CNN fn / CNN International [VC2+]
17	Religious radio (Digital)
18	fXM - Movies from Fox [VC2+]
19	Fox Sports Net
20	University Network - Dr. Gene Scott
21	CNN feeds (occ)
22	Data Transmissions
23	Data Transmissions
24	America One Television

Ku-band

1	11720 H	Data Transmissions
2	11740 V	New Mexico State University (Digital)/Data Transmissions
3	11760 H	Data Transmissions
4	11780 V	Qualcomm Data Transmissions
5	11800 H	GE Medical TIPS TV (Digital)/Data Transmissions
6	11820 V	Occasional video
7	11840 H	Occasional video
8	11860 V	Educational Networks (Digital)/C3D TV (Digital)
9	11880 H	CNN NewsSource [LEITCH]
10	11900 V	National Technology University (Digital)
11	11920 H	Data Transmissions
12	11940 V	Data Transmissions
13	11960 H	Occasional Video/News of Texas (Digital - occ)
14	11980 V	Occasional video
15	12000 H	Occasional video
16	12020 V	Occasional video
17	12040 H	Occasional video
18	12060 V	PBS leased analog/digital services (occ)
19	12080 H	PBS leased analog services (occ)
20	12100 V	PBS services (Digital)
21	12120 H	PBS HDTV (Digital)
22	12140 V	Indiana educational services (Digital)
23	12160 H	PBS services (Digital)
24	12180 V	PBS services (Digital)

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The LNBF Advantage

I can tell it's spring because all the signs are here. There's the roll of distant thunder heralding the first disastrous lightning strike; the buzz of stinging insects daring me to come outside and run their flying gauntlet; and, of course, there's the looming date on the calendar – April 15.

Disregarding the previous gloomy inventory, spring is also a good time to think about your satellite system. Spring tune-ups are a yearly consideration when you want to keep your satellite viewing at its maximum and, for those without satellite systems, spring is also a good time to think about putting one in.

■ Dish Basics

The familiar “dish” which is associated with satellite TV, whether it's an 18-inch DBS or 10-foot C-band dish, is merely a reflector. The microwaves from the satellite at which the dish is pointed bounce off the reflector and into the feedhorn. Due to the parabolic shape of the dish reflector, these signals are all concentrated on a single spot inside the feedhorn. However, the signal is still so weak it's completely worthless unless it's amplified. That's the job of the low noise amplifier.

In the old days, the center mount of a satellite system supported an array of gizmos. The feedhorn was connected to the low noise amplifier which was connected by a thick cable to a downconverter which was brought into the house via smaller RG/6 cable and attached to the receiver. The downconverter is needed because, with C-band satellite signals in the 3-4 GHz range and Ku-band DBS satellites in the 11-12 GHz range, it would take a very thick (i.e., expensive) cable to bring the signal from the dish to the house. Once in the house it would still have to be converted down to frequencies the satellite receiver can tune.

The collection of hardware on the feed support was big, heavy, expensive and made installations that much more tedious. There had to be a better way. And, there was. The first big change was to build the downconverter into the low noise amplifier now known as an LNB.

To switch polarity (change from odd to even channels) there's a small servo motor, which mechanically rotates the antenna probe 90 degrees inside the feedhorn. The big breakthrough here came with a scheme to electronically switch polarity by sending a small amount of voltage to

either a horizontal or vertically aligned antenna probe. This meant there would be no need for a servo motor and that the installation at the feedhorn could be entirely solid state.

In addition, it meant that there was a need only for the RG/6 and a small wire to carry the voltage to either of the probes. One final redesign enabled the voltage to be carried on the RG/6 thus getting rid of the second wire. You can imagine how much easier and cheaper these LNBF installations could be. Having to run only one small cable for the whole system, in the case of small, unsteerable dishes, is a huge advantage.

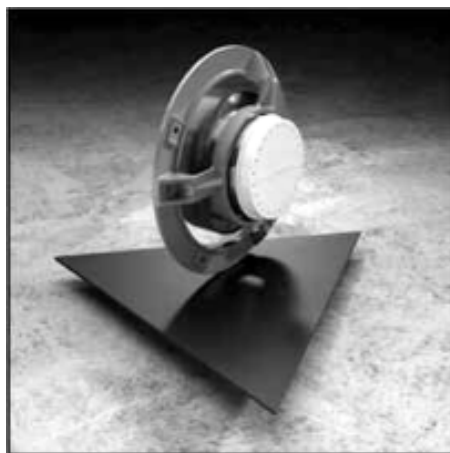


Photo 1. Chaparral's MicroPak Vision, a great performer, easy to install and switches polarity via a voltage carried on the RG/6 cable from the receiver to the dish. (Courtesy Chaparral)

This new device – a combination feedhorn, LNB and electronically switched polarizer – is known as an LNBF. The LNBF advantage is threefold: it's smaller, cheaper and virtually maintenance free. No wonder they were part of the original design for DBS systems!

■ Using LNBFs in New and Old Systems

If your C-band system is five years or older you might consider performing an upgrade from your old feedhorn to a new LNBF. There could be considerable advantage to switching and one advantage is picture quality. LNB efficiency is usually measured as a “noise temperature” figure. At C-band frequencies this temperature is expressed as degrees Kelvin (°K). The lower the noise figure the better the LNB.

Fifteen years ago a 100°K LNA was considered great. By the early 90s noise temperatures had improved to under 50°K. New LNB noise temperatures today are under 20°K.

At Ku-band frequency noise temperature is measured in decibels (dB). Fifteen years ago a good Ku-band LNB was anything under 2.0 dB. Five years ago noise figures for Ku-band below 1.0 dB were common. New Ku-band LNB noise figures are around .5 dB.

As with antenna gain figures in amateur radio, you have to watch out for hyperbole in LNB noise temperature figures. LNB manufacturers typically indicate their lowest figure even though that number might occur at only a small section of frequencies within the C or Ku-bands. Still, virtually any LNB at 25°K (C-band) or under 1.0 dB (Ku-band) will do an excellent job. There is a price component correlating to the noise temperature. Expect to pay an additional \$60 for a 17°K instead of a 25°K LNB and \$50 more for a .5 dB *versus* a .7 dB Ku-band LNB.

A common C-band feedhorn with servo motor costs about \$60. Adding a 25°K LNB will add another \$90 making the total \$150. However, a 25°K LNBF could cost as low as \$90. The LNBF is always cheaper than the feedhorn/LNB, but it also really pays to shop around. Consult as many sources as you can to get the lowest price.

If you're considering buying and installing a new C-band system you should consider starting out with an LNBF. Every \$50 you can save on parts and equipment makes the overall cost of the system that much less.

■ And Now, the Drawbacks

The big disadvantage is that LNBFs are a little harder to align when installing. On standard feedhorn/LNB systems there can be a lot of slop in the correct positioning of the feedhorn at installation. The servo motor can be used to “skew” the reception to make up for the improper polarity alignment.

This is why LNBFs have not totally replaced traditional feeds. Many dealers don't take the time to actually get the installation perfect, relying instead on their ability to mechanically adjust the polarity once the installation is done. This is actually an advantage in the long run because, once installed, LNBFs have to be perfect, thereby giving a much better picture.

The other drawback to using an LNBF is that there's no way to eventually add Ku-band to your



Photo 2. Early LNBs like this one from California Amplifier used a small wire to deliver the voltage to electronically switch polarity.

system. There is no such thing as a C/Ku-LNBF. You must decide from the outset that you're not interested in Ku-band activity. In addition, you can't upgrade the LNB portion of the LNBF since it's attached to the feedhorn. You have to swap out the whole LNBF.

If you're trying to keep costs down on a new system or simply want a maintenance free system, the LNBF is the way to go.

■ The Latest in LNBFs

Chaparral Communications makes a line of quality feedhorns, LNBs and LNBFs for both the American and European markets. Their latest entry is the Adjustable MicroPak Vision, which is an LNBF designed to reduce interference from adjacent satellites (a problem with small, shallow dishes used today), and it features high cross polarity isolation to ensure exact polarity. In addition, the MicroPak features the latest HEMT transistors in its 20°K LNB section.

One other feature is the attachment ring with which the Vision is attached to the feed supports. Designed to be mounted on a buttonhook or tripod mount, the Vision can be rotated in any direction once the frame is attached to the mount to get a perfect picture. It can also be moved in and out in the mount ring to accommodate a variety of dish depths. The "F" connector is mounted on the front, and there is a polar axis indicator stamped into the blue housing to assist polar axis alignment.

The MicroPak Vision is small, easy to install, and can turn your older system into a low maintenance system with much better performance. The MicroPak Vision retails for around \$100. Call your local dealer or the folks at Skyvision whose toll free number is in their ad elsewhere in this magazine.

■ Mailbag

• One MT reader is interested in receiving BBC World programming and suggests buying a Canadian Express Vu DBS system and getting

a Canadian address to make it legal. This is known in the industry as a Gray Market subscription; while it's not exactly kosher it's not entirely illegal. Many Canadians found this was the only way they could watch American cable fare which was not made available in Canada. They trekked across to America to buy VCI C-band satellite systems and used American addresses for billing purposes. If they were discovered, their subscriptions were shut off.

However, there's no need to go the Gray Market route because much of the programming on BBC

World is made part of the BBC America package which is offered by DISH Network. You have to buy a DISH system and subscribe at the \$30/month rate in order to get BBC America, but, in the long run it's got to be easier than trying to get Express Vu. For more info on DISH Network go to their web site at www.dishnet.com.

• MT reader Bill Perrilli writes that he would like to sell his "two new in-the-box solid aluminum dishes which were made in England." He says they are 90 cm and, if you're interested, you can contact him at wperrelli@snet.net for shipping and pricing details.

• After more than 10 years of operating, the C-band audio services known as Super Audio have ceased. Transmitting in analog stereo on Galaxy 5 channel 21 these radio formats were a 24 hour a day staple in many satellite TV homes. The services were operated by Jones International, part of a massive list of satellite services and programs from what used to be Jones Intercable one of the countries largest multi-system cable operators. A spokesperson for Jones said that the partnership agreement which allowed the services to operate had ceased as of January 31 of this year and would not be renewed.

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 - ◆ **Joe Carr's Receiving Antenna Handbook** By J. Carr. Arguably the best book devoted to receiving antennas for long-wave through shortwave. Easy to understand. \$49.95 \$16.90
 - ◆ **Shortwave Listening Guide Book** By H. Helms. Over 300 pages of understandable info. on: selecting and operating a shortwave receiver, simple antennas, time stations, pirates and more. With informative tables and diagrams. ... \$49.95 \$16.90
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Geoff Perry — an Appreciation

It was Max White of the Kettering Group (in Britain) who passed on the sad message that Geoff Perry died suddenly on 18 January.

I first heard about Geoff's work on decoding satellite telemetry sometime back in the early 1970s, while I was working at the Radio and Space Research Station at Slough, near London, UK. Pierre, a friend and colleague of mine, sometimes spent a few hours with me identifying satellites as they passed over the sky. I believe that it was Pierre who first mentioned Geoff Perry.

Geoff was a physics teacher at Kettering Boys Grammar School during the 1960s, and to demonstrate the Doppler effect – in which the source of a fixed frequency (a satellite) moves in relation to the observer – he showed pupils the effect of tuning to satellite frequencies. He taught his students to track these short-wave radio signals from Soviet satellites, and he eventually established a worldwide network of experts who figured out what was going on in the Soviet space program. He and his team came to public prominence in 1966 with their independent discovery of the Plesetsk launch site – an astonishing achievement considering the intense secrecy that surrounded the Soviet space program.

After I returned to Plymouth during the mid-1980s, I built some satellite monitoring equipment and contacted Geoff with a query or two. He provided some information, together with a print-out of a Meteor picture and some suggestions for frequency monitoring. Two years ago, he and I were guest speakers at the residential conference of the Remote Imaging Group and I was delighted to have the opportunity to chat with him. His lecture provided an incredible amount of background information about the Russian space program.

Although my own contact with Geoff was minimal, many others were more fortunate and several have kindly provided personal tributes:

John David Corby is the list-owner of the Internet's *hearsat* list – an email forum for people monitoring satellites. His two-part series

on monitoring the Soviet navsats just completed last month in *Monitoring Times*. The following is quoted with permission:

"Geoff Perry was one of the most outstanding contributors to the field of monitoring satellites. The contacts that I personally had with Geoff over recent months gave me the inspiration to persevere with my own pursuit of this fascinating hobby. I extend my sincere condolences to Geoff's family, and to the other members of the Kettering Group who worked so closely with Geoff over the years. The loss of Geoff Perry closes a chapter on one of the finest stories of amateur contribution to space technology since the dawn of the space age itself. Rest in peace, Geoff."



Fig 1: Geoff Perry visits Sven and talks with son Magnus - courtesy Sven Grahn

Jim Harford, Executive Director Emeritus, American Institute of Aeronautics and Astronautics, provided the following contribution: "In the first years of the Space Age, Geoff Perry's Kettering Group was of immense importance in providing the West, including attentive American Rocket Society members, with fac-

tual information on satellite launchings. We all owe Geoff a great debt for his work over the decades."

Sven Grahn was a Swedish radio amateur who contacted Geoff Perry in the mid-1960s and is now a top official of the Swedish Space corporation in Stockholm. He paid this tribute: "...Geoff was my mentor for 34 years. If there ever was a role model that I wanted to follow it was his: scientific rigour, a minimalistic approach, a no-nonsense attitude to life, and a warm personality."

The following web sites provide an excellent, detailed appreciation of Geoff Perry's achievements and are well worth visiting: *How I started tracking satellites by radio* by Sven Grahn:

<http://www.users.wineasy.se/svengrahn/trackind/getstart/getstart.htm>

The Schoolboy's Tale of Satellite Tracking by Robert Christy:

<http://www.users.wineasy.se/svengrahn/trackind/Ketterin/Bob.htm>

KEY

APT	automatic picture transmission
GOES	Geostationary Operational Environmental Satellite
HRPT	high resolution picture transmission
NOAA	National Oceanic and Atmospheric Administration
WXSAT	weather satellite

Operational WXSATS

My weather satellite and general purpose scanners are both switched on during most of the time that I am in my shack – a basement room. Sometimes I forget to switch on, particularly when I am about to, for instance, clean the telescope (astronomy is my other hobby). Such was the case a few days back late January, when I received an e-mail that Resurs 1-4 had apparently failed. It was January 30 that the picture transmissions (APT) were reduced to an unmodulated tone on 137.85 MHz. This situation lasted for a few days until February 4 when transmissions returned to normal.

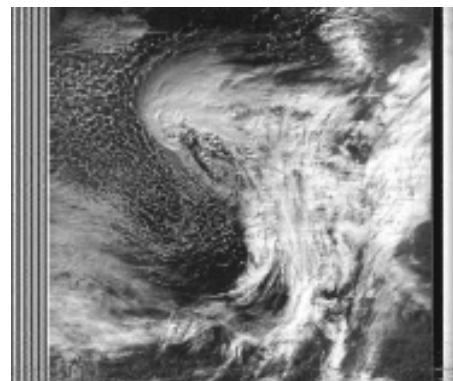


Fig 2: Resurs 1-4 south-bound pass over eastern Atlantic showing vigorous depression approaching northern Scotland

Meteor 3-5 is currently making southbound passes during mid-morning. Because the satellite only transmits APT when in sunlight, we only hear daytime transmissions. By March, the orbital plane of Meteor 3-5 will have moved forwards into the morning terminator so that it will once more be in conditions of limited solar power. For a few weeks in March it may be switched off, so anticipate a quiet spell on 137.30 MHz as Meteor 3-5 rests.

With the worst of the dark winter days passed, the early afternoon NOAA-14 passes are once more providing better visible-light images.

See the NASA site <http://rsd.gsfc.nasa.gov/> for images from most geostationary wxsats.

Software updates

The New Year brought a few instances of problems with satellite tracking programs. In

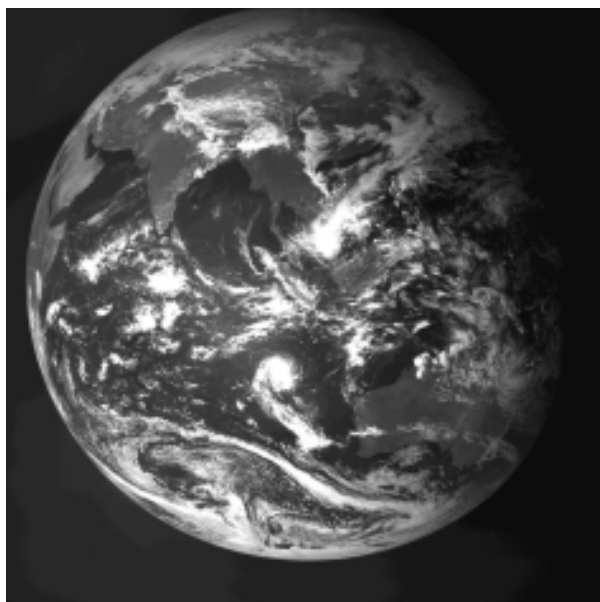


Fig 3: Feng-yun-2 Chinese geostationary wxsat image, 6 February courtesy GSFC

practically every case, authors have modified software to cope with the change. I experienced an interesting bug with my son's home-produced satellite predictions program written maybe a decade ago (when he was twelve). Feeding in NASA's new elements around January 4 produced no apparent updates.

A few seconds of thought and I realized that all should be well if I erased all satellites from the database and simply reread the new two-line elements back in. The internal epoch checks had decided that 99350 was bigger than 00005 (which, of course, it is)! All the data was fine after deleting and re-input.

Meanwhile, most well-known programs were already Y2k compliant, and most lesser-known but well-loved programs have been updated. The only program that appears unlikely to be revised is PC-Track version 3.1. This was released many years ago but the author has never been contactable, and the program data can apparently not be updated.

■ Internet site recommendation

The Remote Imaging Group is a British organization consisting of amateur and professional weather satellite enthusiasts. It maintains a web site at: <http://www.rig.org.uk/>

The site carries direct links to a number of programs for use by WXSAT hobbyists, including the following utility programs:

Satmon -

a program that records APT received via a sound-card in your computer.

Wxtrack -

David Taylor's program for satellite predictions.

Digital Atmosphere -

described as a powerful weather analysis and forecasting tool which runs under Windows, and lets you monitor weather developing anywhere on the Earth.

■ New GOES system hardware

When possible, I try to provide information from the manufacturers of equipment made for the weather satellite market. Let us be honest – this hobby is a fairly specialist one for the discerning amateur; virtually every piece of equipment sold for the WXSAT hobbyist is specially designed – and that means it's likely to be costly.

A remarkable new, low-cost GOES (and Meteosat) system, consisting of a downconverter and active feed, has been under test in my backyard for several weeks. The system is a joint project by Timestep Weather Satellite Systems and Britain's Remote Imaging Group. What does it do? Using a small dish to receive 1691.0 MHz wifax transmissions, this is amplified by the active feed unit, and the down-converter converts them to

137.50 MHz. This VHF signal can then be fed to a standard 137 MHz band weather satellite receiver for normal picture decoding.

The hardware is essentially designed for those who already have a weather satellite receiver and decoder for polar orbiting satellites – the NOAAs and Meteors. Such systems have an input for an APT antenna operating in the 137 MHz band.

The equipment is very compact, and can use a dish between 60 and 80cm – the smallest dish ever used for Wefax reception. The active feed costs \$135 and the downconverter costs \$90. They are available from Swagur Enterprises: phone/fax 608-592-7409, or from Timestep: e-mail Information@Time-step.com

■ Dayton Hamvention

This US radio event is held annually each May in Dayton, Ohio. The show extends over three days with specialist forums, four large halls full of traders, a couple of thousand fleamarket pitches, and is attended by some 35,000 amateurs from all over the world. This year there will be a Weather Forum, taking place on Friday, May 19 from 10a.m. to 12 noon at the Hara Arena, home of the Dayton Hamvention. The reins for moderating the Weather Forum are in the hands of Dave Cawley, who is seeking speakers for sessions averaging twenty minutes. Volunteers willing to talk on the weather satellite topic of their choice, please contact Dave Cawley – e-mail address: Information@Time-step.com

■ And finally

Although it is completely off-topic, I have included a picture of the Mayflower Steps on the Barbican in Plymouth, UK, where I live. This local tourist attraction is almost always populated with Americans visiting the place where the Pilgrim Fathers set off on their journey to America all those years ago. I live just a few miles away in the suburb of Peverell, and hope this picture is of interest to those who may never get to see the original.



Fig 4: Mayflower Steps on the Barbican in Plymouth, UK

FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
 NOAA-15 transmits APT on 137.50 MHz
 NOAAs transmit beacon data on 137.77 or 136.77 MHz
 Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
 Resurs 1-4 transmits APT on 137.85 MHz
 Okean-0, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
 GOES-8 and GOES-10 use 1691 MHz for WEFAX

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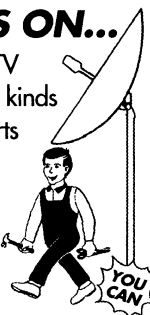
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NASA Trunked Systems

In this month's *Fed Files* we are going to take a look at some of the NASA trunking systems around the country. We will start our journey at Moffett Federal Airfield in California and the NASA Ames Research Center trunking system. A special *Fed File* tip of the hat to Ed Tobiasz who posted this information to the net. Also thanks to David Hall for posting this list to the Fedcom internet email newsgroup.

NASA Ames/Moffett Federal Airfield Trunking System

Information courtesy of Ed Tobiasz via David Hall/Fedcom

Frequencies: 406.550 407.350 408.350
408.950 409.750 411.350
412.800

Trunk Group User

02-020	Security Fleet
02-021	Security Admin/Operations
02-022	Police dispatch
02-023	Unknown Fleet
02-026	Unknown Fleet
02-027	Police Tac 1
02-030	Police Tac 2
02-031	Air Force Security
02-032	CLETS
02-040	Maintenance Fleet
02-041	Trouble Desk
02-042	HVAC
02-043	Electricians
02-044	Plumbers
02-045	General Maintenance
02-046	Mechanical
02-047	Maintenance Manager
02-050	Construction
02-051	Public Works Dispatch
02-052	High Voltage Crews
02-063	OPX
02-067	Flight Operations
02-072	Facilities Engineering
02-073	Unknown Fleet
02-074	Unknown Fleet
02-080	Administration Fleet
02-081	A-OP
02-083	FSR
02-084	Safety
02-085	Supply
02-090	Public Affairs
02-091	Chemical Waste
02-092	Logistics
02-093	Transportation
02-094	Unknown Fleet
02-101	Medical Operations
02-120	Fire Fleet
02-121	Fire Dispatch
02-122	Fire Tac 1
02-123	Fire Administration
02-124	Fire Tac 2
02-125	Fire White (154.28 MHz)
02-126	Fire Blue (152.845 MHz)
02-127	Fire Training
02-130	Tower
02-131	ATCAL Maintenance

02-140	Unknown Fleet
02-142	Unknown Fleet
02-143	Data Communications
02-144	Vidnet

03-001	Navy operations
03-011	Unknown Fleet
03-021	EOC Operations
03-022	DART Operations
03-023	DART 1
03-024	DART 2
03-025	DART 3
03-026	ERT/HAZ
03-027	DART Common
03-030	DART CC

03-067	NFAC Wind Tunnel Operations
03-070	NFAC Electrical
03-071	Unknown Fleet
03-073	OARF
03-075	NFAC-MP
03-076	HPADS
03-077	Unknown Fleet
03-101	911A
03-141	Systems Test (Radio)

From the Fed File archives, here is a list of the other known NASA trunking systems throughout the country. We would be grateful to any monitors who might be able to update us on talkgroup IDs on any of these systems. You can write us in care of the magazine or send your contribution direct to: larry@grove-ent.com.

Marshall Space Flight Center, Huntsville, Alabama
406.350, 407.150, 407.950, 408.750, 409.550

Michoud Assembly Facility, New Orleans, Louisiana
406.550, 407.350, 408.150, 408.950, 409.750

Goddard Space Flight Center, Greenbelt, Maryland
407.000, 408.150, 408.625, 409.525, 410.275

John C. Stennis Space Flight Center, Mississippi
406.350, 407.150, 407.950, 408.750, 409.550

Glenn Research Center, Cleveland, Ohio
406.350, 407.150, 407.950, 408.750, 409.550

Johnson Space Flight Center, Houston, Texas
406.350, 407.150, 407.950, 408.550, 408.750, 408.950, 409.150, 409.550, 409.750, 409.950



NASA's Mission Control Center in Texas (courtesy NASA)

03-031	DART Haz
03-032	Wind Tunnel Fleet 1
03-041	87-foot Wind Tunnel Operations
03-042	97-foot Wind Tunnel Operations
03-043	11-foot Wind Tunnel Operations
03-044	12-foot Wind Tunnel Operations
03-045	PSCL Operations
03-046	12-foot Wind Tunnel Test
03-047	IT1
03-050	Auxiliary Operations
03-051	FAC Maintenance
03-052	FAC Electrical
03-053	Unknown Fleet
03-054	PSP
03-060	Unknown Fleet
03-061	Unknown Fleet
03-064	HPADOPS
03-065	Computer Maintenance
03-066	SVS

Just a reminder to all our readers, our exclusive, updated and complete list of NASA frequencies (including the Space Shuttle) is available online at the Grove Enterprises website (<http://www.grove-ent.com>) free of charge. This list covers major NASA facilities and includes frequencies used throughout the radio spectrum. If you need NASA frequencies, this is the only list you will ever need.

Also this month we continue our exploration of the VHF high government frequency band, started in the December 1998 issue of the *Fed Files*, by profiling the 171.0-171.9875 MHz range in Table 1.

So load up those scanners and let us know what you are hearing in the federal bands. Until next month, good hunting.

Table One: Federal Frequency Allocations: 171- 171.9875 MHz

171.0000	Air Force, Army, Bureau of the Mint, Energy Department, FAA, FDA, Forestry Service, NASA (Nationwide), Post Office	171.3875	Agriculture Department, Air Force, Army, Bureau of the Mint, Corps of Engineers, Energy Department, Federal Reserve System, Forestry Service, NASA, Post Office, TVA, Veterans Administration	171.6625	Interior Department (Nationwide), National Park Service, Railroad Transportation Center, TVA
171.0125	(No reported activity)			171.6750	(No reported activity)
171.0250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.3968	Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)		Bureau of Land Management, Bureau of Reclamation, Commerce Department, Fish and Wildlife Service, Geologic Survey (Nationwide), Interior Department (Nationwide), National Park Service
171.0375	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4000	Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)	171.6875	(No reported activity)
171.0450	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power	171.4031	Low power, non-voice 5 kHz bandwidth splinter frequency	171.7000	Agriculture Department (Nationwide), Animal and Plant Health Inspection Service, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Forest Service, Interior Department (Nationwide), National Park Service, Soil Conservation Service, TVA
171.0500	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4062	Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)		(No reported activity)
171.0625	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4093	Low power, non-voice 5 kHz bandwidth splinter frequency		Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation (Nationwide), Interior Department (Nationwide), National Park Service
171.0750	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4125	Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)	171.7125	(No reported activity)
171.0875	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4156	Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)	171.7250	Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation (Nationwide), Coast Guard, Energy Department, FBI, Federal Railroad Administration, Geologic Survey, Interior Department (Nationwide), National Institute of Health, National Park Service
171.1000	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4250	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, Energy Department, Forest Service, Geological Survey, Soil Conservation Service, State Forestry Services (GA/IL/MI/VA)	171.7375	(No reported activity)
171.1050	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power		(No reported activity)	171.7500	Army, Bureau of Indian Affairs, Bureau of Reclamation, Fish and Wildlife Service, Interior Department (Nationwide), National Park Service, Transportation (Nationwide), TVA
171.1125	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4375	DEA (Nationwide), FBI, Fish and Wildlife Service, Forest Service		(No reported activity)
171.1250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	171.4500	(No reported activity)	171.7625	Bureau of Indian Affairs, Bureau of Reclamation, Energy Department, Interior Department (Nationwide), National Park Service
171.1375	Agriculture Department (Nationwide)	171.4625	(No reported activity)	171.7750	Bureau of Indian Affairs, Bureau of Reclamation, Energy Department, Interior Department (Nationwide), National Park Service
171.1500	Air Force, Army, Coast Guard, Energy Department, Forest Service, NASA, Post Office, Transportation Department (Nationwide), Veterans Administration	171.4750	Agriculture Department (Nationwide), Agriculture Extension Service, Agriculture Research Service, Animal and Plant Health Inspection Service, Forest Service, State of Montana (Fire Suppression and Interagency dispatch)		(No reported activity)
171.1625	Interior Department (Nationwide)		(No reported activity)	171.7875	Agriculture Department (Nationwide)
171.1750	Meteorological/Quasi-Hydrologic Operations (center frequency)	171.4875	(No reported activity)	171.8000	Army, FBI, Environmental Research Lab (Nationwide), NOAA (Nationwide), National Ocean Survey (Coastal Areas), National Park Service, National Weather Service, Veteran's Administration
171.1875	(No reported activity)	171.5000	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service (Nationwide), Bureau of Indian Affairs, Bureau of Prisons, Customs Service, Federal Law Enforcement Training Center, Forest Service, Post Office, Veterans Administration	171.8125	(No reported activity)
171.2000	Energy Department (Nationwide)		NASA (Nationwide)	171.8250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2125	Federal Reserve System	171.5125	Agriculture department (Nationwide), Agriculture Research Service (Nationwide), Animal and Plant Health Inspection Service (Nationwide), Army, Energy Department, Forest Service, National Park Service, Veterans Administration	171.8375	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2156	Low power, non-voice 5 kHz bandwidth splinter frequency (until January 1, 2005)	171.5250	Interior Department (Nationwide)	171.8450	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power
171.2187	Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)		Agriculture Department (Nationwide), Agriculture Extension Service, FBI, Forest Service	171.8500	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2218	Low power, non-voice 5 kHz bandwidth splinter frequency	171.5375	Animal and Plant Health Inspection Service (Nationwide)	171.8625	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2250	Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)	171.5500	Animal and Plant Health Inspection Service, Bureau of Land Management, Forest Service, Geologic Survey, Soil Conservation Service, State Forest Service (MI/MN)	171.8750	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2281	Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)		(No reported activity)	171.8875	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2375	Army, Coast Guard (Nationwide), Energy Department, Health and Human Services (Nationwide-various agencies), Railroad Transportation Center	171.5625	(No reported activity)	171.9000	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2500	Navy	171.5750	Animal and Plant Health Inspection Service, Bureau of Land Management, Forest Service, Geologic Survey, Soil Conservation Service, State Forest Service (MI/MN)	171.9050	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power
171.2625	Air Force, Army, Bureau of Prisons, Bureau of the Mint, Coast Guard, Energy Department, FAA, FBI, Federal Reserve System, Forestry Service, Labor Department, NASA, National Park Service, Navy, Post Office, Veterans Administration	171.5875	(No reported activity)	171.9125	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2750	(No reported activity)	171.6000	DEA, FBI (Nationwide), Forest Service	171.9250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies
171.2875	White House Communications Agency (Nationwide-Zulu)		(No reported activity)	171.9375	(No reported activity)
171.3000	(No reported activity)	171.6125	(No reported activity)	171.9500	Energy Department (Nationwide)
171.3125	Coast Guard (Nationwide), Energy Department, Transportation Department	171.6250	Bureau of Indian Affairs, Bureau of Reclamation, Energy Department, FBI, Geologic Survey, Interior Department (Nationwide), National Park Service, Navy, Post Office	171.9625	(No reported activity)
171.3250	(No reported activity)		NASA (Nationwide)	171.9750	Air Force, Army, Bureau of Prisons, Corps of Engineers, Energy Department, FAA, FBI, Federal Law Enforcement Training Center, Forest Service, Geologic Survey, Labor Department, National Park Service, Navy, Post Office, Senate, Veterans Administration
171.3375	Army, Coast Guard (Nationwide), Energy Department, Social Security Administration, Transportation Department	171.6375	Bureau of Indian Affairs, Bureau of Reclamation, Fish and Wildlife Service,		(No reported activity)
171.3500	(No reported activity)	171.6500			
171.3625	Coast Guard (Nationwide), FDA, Transportation Department (Nationwide)				
171.3750	(No reported activity)				

Ericsson's EDACS Trunking

Motorola has several competitors in the trunked public safety radio system marketplace. One popular alternative is the Ericsson/General Electric Enhanced Digital Access Communications System, or EDACS for short.

EDACS operates in VHF, UHF, 800, and 900 MHz bands and is used by private businesses as well as public safety organizations. Second generation trunk-tracking scanners such as the Bearcat 245XLT and PRO-92, as well as publicly available computer software, are capable of scanning these systems effectively.

Channels

Each repeater site in an EDACS system has a dedicated Control Channel that continuously transmits signaling and command information out to the mobile radios. Channel requests and other mobile messages are transmitted to the repeater on this channel as well. Listening to this channel on a normal scanner will result in just a constant buzz of digital information.

Each EDACS site, in addition to the Control Channel, may have as many as 23 Working Channels. These channels carry voice and data between mobile radios and dispatch centers.

From an operational perspective EDACS systems have better performance should equipment fail or interconnections be lost. If the central controller in a Motorola system fails or cannot communicate with a repeater, the repeater will revert to conventional mode, losing all ability to trunk and forcing users to share frequencies manually. EDACS, on the other hand, goes into a "failsoft" mode where trunking cards at each repeater site continue to provide basic trunking features.

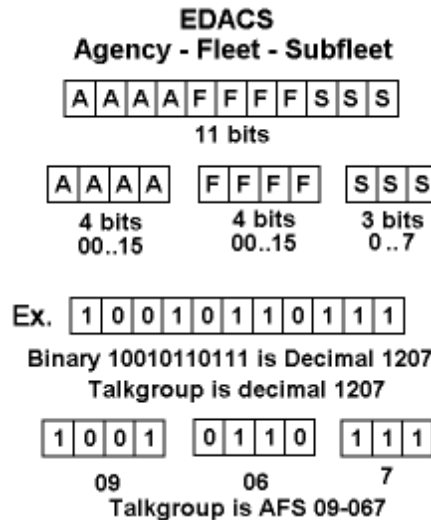
Another difference between Motorola and EDACS is how channels are assigned. Control messages in a Motorola system use an FCC channel number to indicate the specific radio frequency to use, so listeners can enter those frequencies into trunk-tracking scanners in any order.

EDACS, however, assigns each radio frequency a Logical Channel Number (LCN). These LCNs are programmed into each radio in the system, and the control channel uses the LCN to instruct a radio to tune to the corresponding frequency. What this means is that a listener must enter EDACS frequencies in LCN order in order to track the system properly.

Talkgroups

EDACS talkgroups are divided into agencies. Each agency has a number of fleets, and each of these fleets has a number of subfleets. This hierarchy is similar to a Motorola Type I system, although there are no limitations on the number of individual radios in each subfleet. This Agency-Fleet-Subfleet scheme is abbreviated AFS.

EDACS uses 11 binary digits (bits) to identify a talkgroup. These 11 bits are divided into three pieces, one piece for the Agency, one for the Fleet, and one for the Subfleet. Each of these pieces uses a certain number of the 11 total bits to represent the identifying number. Each EDACS system may divide these bits up differently, but the most common arrangement for public safety agencies is four bits for the Agency, four bits for the Fleet, and the remaining three bits for Subfleet. This is represented by the last entry in the table, which shows a maximum of 16 Agencies, 16 Fleets per Agency, and 8 Subfleets per Fleet.



POSSIBLE EDACS AFS ASSIGNMENTS

Agencies	Fleets	Subfleets
2	4	256
2	8	128
2	16	64
2	32	32
4	32	16
8	8	32
8	16	16
16	16	8

The AFS is usually shown in the format AA-FFS where AA is the Agency, FF is the Fleet and S is the Subfleet. Newer trunk-tracking scanners that support EDACS default to displaying talkgroups in AFS format rather than a simple decimal number. The AFS format makes it easier to scan entire Agencies and/or Fleets without needing to enter each individual talkgroup. The Bearcat 245XLT in particular has a feature called XPAND which is designed to do just that.

Some talkgroups have a special function. The first talkgroup in the system, 00-000, is known as "System All-Call." Every radio in the system will hear a message sent to this talkgroup.

Similarly, an "Agent All-Call" is the first talkgroup in an Agency, where the Fleet and Subfleet are both zero. For instance, a transmission to talkgroup 03-000 would be heard by all radios assigned to that Agency.

There is also a "Fleet All-Call" which is the first talkgroup in each fleet. A transmission to talkgroup 04-080, for example, would be heard by every radio in Fleet 8 of Agency 4.

Ocean City, Maryland

This resort town on Maryland's Eastern Shore operates an EDACS for several city agencies through two 800 MHz towers. The primary site has eleven repeaters while a backup site a few miles away has three.

LCN Frequency

1	859.9875
2	853.9625
3	855.2375
4	860.9875
5	856.7375
6	857.7375
7	858.7375
8	859.7375
9	860.7375
10	856.2375
11	857.2375

TALKGROUPS

POLICE

02-021	Boardwalk
02-022	Patrol
02-023	Tactical 2
02-024	Channel 4
02-025	Tactical 1
02-026	Channel 6
02-027	Channel 7
02-030	Channel 8

FIRE/EMS

02-041	Fire/EMS Dispatch
02-042	Fire Operations 1
02-043	Fire Operations 2
02-044	EMS Operations
02-045	Trooper/Helicopter
02-046	US Coast Guard
02-047	Worcester County
02-050	Fire Marshals
02-051	Emergency
02-052	Beach Patrol Channel 1

PUBLIC WORKS

02-061	Public Works 1
02-062	Public Works 2
02-063	Solid Waste
02-064	Recycling
02-065	Transportation 1
02-066	Transportation 2
02-067	Ocean City Airport
02-070	Building Inspectors
02-077	Wastewater

Brevard County, Florida

Florida's "Space Coast," home to Merritt Island, Cape Canaveral, and the historic Launch Complex 39, lies within Brevard County. The county operates an interconnected EDACS system through 400 foot towers in Titusville, Rockledge, and Palm Bay.

LCN	NORTH Titusville	CENTRAL Rockledge	SOUTH Palm Bay
1	866.2125	866.0750	866.1250
2	866.8250	866.3250	866.5875
3	868.1625	866.6250	867.0375
4	868.7375	868.5375	868.0750
5	866.2625	868.7875	866.2500
6	866.5500	866.1875	868.3750
7	868.4125	868.6000	868.5625
8	868.6875	868.8500	868.8125
9	866.7625	867.1250	866.3000
10	867.2625	867.3750	866.3750
11	867.7625	867.6250	866.6750
12	868.5125	867.8750	866.9000
13	855.2375	-	867.5375
14	851.0125	-	866.5625
15	-	-	868.6250
16	-	-	856.7625
17	-	-	857.7625
18	-	-	858.7625
19	-	-	859.7625
20	-	-	860.7625

One channel at each site is assigned as a Control Channel. Because any channel in an EDACS system has the capability of operating as a control channel, the assignment may change. The southern site, which includes the city of Melbourne, has more frequencies due to a higher level of activity. Telephone interconnect activity appears to be limited to Channel 2 frequencies.

Illinois State Police

The Illinois State Police in the District Chicago area operate two interconnected EDACS systems for a number of local, state, and federal agencies. District Chicago was formed five years ago out of the old District 3 (Chicago) and District 4 (Crestwood). Several sites in Cook County and surrounding suburbs provide coverage throughout Chicagoland.

The two systems are divided into North and South, with the Eisenhower Expressway as the dividing line. Each has ten channels.

LCN	North	South
1	866.4625	866.4125
2	866.8875	866.4375
3	867.9625	866.9375
4	866.3875	867.4125
5	867.4625	867.9375
6	867.8875	867.9125
7	868.3875	868.4375
8	868.4625	868.4125
9	868.8875	868.9375
10	868.9625	868.9125

The Illinois State Police operates three patrols in the District, North ("Nora"), Middle ("Mary") and South ("Sam"). Argonne is a National Laboratory operated by the Department of Energy located about 25 miles southwest of Chicago.

06-021	Illinois Department of Transportation
06-022	Chicago Fire Department
06-047	North Dispatch
06-053	Dispatch
08-021	Detail/Surveillance
08-022	North Dispatch
08-024	North Car to Car
08-041	Middle Dispatch
08-044	Middle Car to Car
08-061	South Dispatch
08-064	South Car to Car
08-094	Gangs Middle
08-114	Gangs North
08-116	Gangs South
08-121	Priority
08-122	Car to Car
08-123	Surveillance North
08-124	Surveillance South
08-134	Air 1
09-007	DuPage Fire Protection District
09-010	DuPage Fire Protection District
09-031	Drug Enforcement Administration
09-054	Illinois Department of Corrections
14-021	Radio Technicians
14-056	Radio Technicians
14-061	Argonne Fire Department
14-062	Argonne Fire Department
14-063	Argonne Security

Dallas/Fort Worth Airport, Texas

The Dallas/Fort Worth Airport, home to American Airlines, uses an EDACS system for a variety of ground operations including security, fire, emergency medical services (EMS) and transportation.

LCN	FREQUENCY
1	866.0875
2	866.5875
3	867.5875
4	868.0875
5	868.4625
6	866.4625
7	866.9875
8	867.4625
9	868.7125
10	868.9375
00-157	Fire/EMS Alert Operations
02-021	Police 1
02-022	Police Meet Me
02-023	Police 2
02-026	Police 7
04-021	Operations (Primary)
04-023	Operations
04-024	Operations
04-061	Maintenance (Primary)
04-064	Electrical Maintenance
04-065	Bird Operations
04-070	Operations
04-101	Trains (Primary)
04-102	Transit
04-104	Transit
04-106	Transit
06-023	EMS Response
06-033	Police 10
06-041	Fire Response
06-044	Fire Response
06-045	Fire Response
06-046	Fire Response
06-047	Police 5

That's all for this month. I welcome comments, corrections, additional listings, and questions via electronic mail at dan@decodesystems.com. There is also more radio-related material on my website at www.decodesystems.com. Until next month, happy monitoring!

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Petroleum and Power Service Allocations

This month's *Service Search* column continues our in-depth look at the new Industrial/Business Pool, which has been condensed into four service categories. This month we profile the IP or Petroleum allocations and the IW or Power Services.

These frequencies are currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

1614 kHz	IP	Base or mobile	AM mode only	47.90	IW	Base or mobile	451.025	IW	Base or mobile	
25.02	IP	Base or mobile		47.92	IW	Base or mobile	451.03125 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.04	IP	Base or mobile	Oil Spill Containment	47.94	IW	Base or mobile	451.0375 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
25.06	IP	Base or mobile		47.96	IW	Base or mobile	451.04375 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.08	IP	Base or mobile	Oil Spill Containment	47.98	IW	Base or mobile	451.050	IW	Base or mobile	
25.10	IP	Base or mobile		48.00	IW	Base or mobile	451.05625 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.12	IP	Base or mobile		48.02	IW	Base or mobile	451.0625 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
25.14	IP	Base or mobile		48.04	IW	Base or mobile	451.06875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.16	IP	Base or mobile		48.06	IW	Base or mobile	451.075	IW	Base or mobile	
25.18	IP	Base or mobile		48.08	IW	Base or mobile	451.08125 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.20	IP	Base or mobile		48.10	IW	Base or mobile	451.0875 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
25.22	IP	Base or mobile		48.12	IW	Base or mobile	451.09375 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.24	IP	Base or mobile		48.14	IW	Base or mobile	451.100	IW	Base or mobile	
25.26	IP	Base or mobile		48.16	IW	Base or mobile	451.10625 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.28	IP	Base or mobile		48.18	IW	Base or mobile	451.1125 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
25.30	IP	Base or mobile		48.20	IW	Base or mobile	451.11875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
25.32	IP	Base or mobile		48.22	IW	Base or mobile	451.125	IW	Base or mobile	
30.70	IP	Base or mobile		48.24	IW	Base or mobile	451.13125 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
30.78	IP	Base or mobile		48.26	IW	Base or mobile	451.1375 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
33.18	IP	Base or mobile		48.28	IW	Base or mobile	451.14375 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
33.20	IP	Base or mobile		48.30	IW	Base or mobile	451.150	IW	Base or mobile	
33.22	IP	Base or mobile		48.32	IW	Base or mobile	451.15625 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
33.24	IP	Base or mobile		48.34	IW	Base or mobile	451.1625 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
33.26	IP	Base or mobile		48.36	IW	Base or mobile	451.16875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
33.28	IP	Base or mobile		48.38	IW	Base or mobile	451.200	IW	Base or mobile	
33.30	IP	Base or mobile		48.40	IW	Base or mobile	451.20625 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
33.32	IP	Base or mobile		48.42	IW	Base or mobile	451.2125 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
33.34	IP	Base or mobile		48.44	IW	Base or mobile	451.21875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
33.36	IP	Base or mobile		48.46	IW	Base or mobile	451.250	IW	Base or mobile	
33.38	IP	Base or mobile		48.48	IW	Base or mobile	451.25625 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
36.25	IP	Base or mobile	Oil Spill Containment/Shared with Fed government	48.50	IW	Base or mobile	451.2625 IW	Base or mobile	Bandwidth not to exceed 11.25 kHz	
37.46	IW	Base or mobile		48.52	IW	Base or mobile	451.26875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
37.48	IW	Base or mobile		48.54	IW	Base or mobile	454.000	IP	Base or mobile	Frequency primarily available for oil spill containment
37.50	IW	Base or mobile		150.980	IP	Base or mobile				
37.52	IW	Base or mobile		150.9875	IP	Base or mobile				
37.54	IW	Base or mobile					456.01875 IW	Base or mobile	Bandwidth not to exceed 6 kHz	
37.56	IW	Base or mobile					456.025	IW	Mobile	
37.58	IW	Base or mobile		153.410	IW	Base or mobile	456.03125 IW	Mobile	Bandwidth not to exceed 6 kHz	
37.60	IW	Base, mobile, or operational fixed		153.4175	IW	Base or mobile	456.0375 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
				153.470	IW	Base or mobile	456.04375 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.4775	IW	Base or mobile	456.050	IW	Mobile	
				153.530	IW	Base or mobile	456.05625 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.5375	IW	Base or mobile	456.0625 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
				153.590	IW	Base or mobile	456.06875 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.5975	IW	Base or mobile	456.075	IW	Mobile	
				153.650	IW	Base or mobile	456.08125 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.6575	IW	Base or mobile	456.0875 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
				153.695	IW	Base or mobile	456.09375 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.7025	IW	Base or mobile	456.100	IW	Mobile	
				153.710	IW	Base or mobile	456.10625 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.7175	IW	Base or mobile	456.1125 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
				153.725	IW	Base or mobile	456.11875 IW	Mobile	Bandwidth not to exceed 6 kHz	
				153.7325	IW	Base or mobile	456.125	IW	Mobile	
				154.585	IP	Mobile	456.13125 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.1375 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
							456.14375 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.150	IW	Mobile	
							456.15625 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.1625 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
							456.16875 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.200	IW	Mobile	
							456.20625 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.2125 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
							456.21875 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.250	IW	Mobile	
							456.25625 IW	Mobile	Bandwidth not to exceed 6 kHz	
							456.2625 IW	Mobile	Bandwidth not to exceed 11.25 kHz	
							456.26875 IW	Mobile	Bandwidth not to exceed 6 kHz	
							459.000	IP	Base or mobile	Frequency primarily available for oil spill containment
				451.01875 IW	Base or mobile	Bandwidth not to exceed 6 kHz				

Aeronautical Radio, Incorporated

Welcome aboard and fasten your seatbelts. Today we are going to visit Aeronautical Radio, Incorporated (ARINC) and learn about their VHF and HF voice services. Thanks to Curtice L. Lewis of ARINC's Corporate Headquarters for permission to use this information in *Plane Talk*.

■ Domestic VHF Voice Communications Service

What is Air/Ground Domestic? ARINC's Air/Ground Domestic radio service is the aeronautical industry's air-to-ground and ground-to-air voice communications link for operational messages. With a network of over 100 VHF radio stations in the United States, Air/Ground Domestic supplies complete en route coverage and on-ground coverage at most major airports. The radio stations are connected to ARINC's San Francisco Communications Center, where ARINC radio operators monitor the VHF frequencies, receive calls, transcribe messages, and route calls as customers request, 24 hours per day.

ARINC maintains blanket coverage in the U.S. above 20,000 and on-ground coverage at most major U.S. airports. Air/Ground Domestic's network supports the major flight routes in the U.S. At no charge to carriers, ARINC performs charting studies, computer analysis, and flight checks to ensure network availability along their popular flight paths.

The Air/Ground Domestic network offers constant access throughout en route travel. As aircraft fly their routes, calls are handed off between stations so calls are not interrupted. Calls are *not* cut off as they would be with a dial-access radio station.

ARINC's demanding quality control ensures that Air/Ground Domestic meets stringent Federal Aviation Administration (FAA) and Federal Communications Commission (FCC) regulations. Seventy-five percent of calls are answered within 10 seconds or less, and 94 percent are answered within one minute.

ARINC maintains a better than 99.7 percent availability of the Air/Ground Domestic network system. ARINC-designated employees ride in cockpit jumpseats and visit stations to monitor quality and check network performance. If problems occur, ARINC has a staff of on-call technicians located throughout the United States who are quickly dispatched to repair radios.

ARINC has more than 45 years of experience operating Air/Ground Domestic and more than 70 years of experience serving aviation communications needs. They handle the needs of all aircraft, from the smallest business aircraft to the largest U.S. airline. Air/Ground Domestic serves *all* major U.S. airlines, as well as over 500 national and regional airlines; cargo carriers; and corporate, business, and charter aircraft operators. Air/Ground Domestic handles over 14,000 contacts a month and has sufficient capacity to handle many more calls.

ARINC radio operators have experience handling routine and special situation messages. For example, the Air/Ground Domestic staff has handled phone patches between onboard personnel and medical experts at a national hospital and between flight crew and airframe experts at an airframe manufacturer.

ARINC offers many ways to deliver messages to meet specific needs. Air/Ground Domestic radio operators can: Send transcribed messages by ARINC Data Network to any International Civil Aviation Organization (ICAO) worldwide. Deliver messages by telephone. Provide a phone patch to any phone number while en route. Deliver ground-originated calls to the aircraft anywhere in the coverage area. Signal the aircraft's Selective Calling System (SELCAL) that a message is incoming so the pilot need not monitor the frequency for calls.

A 30-day tape recording of all conversations is maintained should an after-the-fact analysis of a problem be required.

■ International HF/LDOC Voice Communications Service

ARINC provides the only HF communications link to the FAA in those international areas for which the FAA has control. ARINC's Air/Ground International radio service also provides high frequency single side band aeronautical operational control (AOC) voice communications for aircraft flying over the Atlantic and Pacific Oceans, Caribbean, Gulf of Mexico, and Central and South America.

ARINC connects far-reaching corners of the world to one of two HF long distance operational control (LDOC) facilities located in New York and San Francisco. The New York facility extends coverage east toward Europe and African and south toward Central and South America. The San Francisco facility extends coverage north to Alaska, west to Russia, and south to Australia and South America.

VHF voice communications are also available at oceanic gateways along the east, west, and Gulf coasts and Hawaii. They are used to augment the HF service until the aircraft is no longer in range of the VHF ground stations.

ARINC Air/Ground International Service is available around the clock and has current weather and forecast data available for virtually any location.

Air/Ground International Service can be used to:

Make ground arrangements – Corporate jets can use a phone patch to contact a fixed-base operator to make arrival arrangements.

Coordinate flight and ground activities – Airlines can control and track arrival times.

React quickly to changes – Dispatch can divert an aircraft from its flight plan to pick up unscheduled passengers or freight.

Handle irregular operations – Pilots can resolve weather-induced irregular operations.

Stay in touch while aloft – When in U.S. FIRs, aircraft can be advised to activate an LDOC frequency, eliminating the need to constantly monitor.

Inform dispatch of important events

Provide emergency communications

Obtain ATIS messages – Automatic Terminal Information Service (ATIS) information is available at the pilot's convenience.

Message delivery options for Air/Ground International offer the same wide range of service as does the VHF Domestic Voice Communications.

ARINC's professional staff of over 100 experienced radio operators are the industry's only operators who routinely handle air traffic control messages for the Federal Aviation Administration (FAA). Radio operators handle more than 210,000 contacts each month from communications centers with capacity to handle many more.

Thanks, Curtice! Visit ARINC's website at www.arinc.com

■ Miami ARTCC Frequencies

These frequencies were contributed by a controller friend of mine who works at Miami ARTCC. The 3-letter code next to the frequency is the sector to which it belongs:

AVO	Avon Park
EYW	Key West
FK7	Exuma, Bahamas
FMV	Fort Meyers
GTK	Grand Turk Is.
MIA	Miami
MLB	Melbourne
PBI	West Palm Beach
PHK	Pahokee
SRQ	Sarasota
VRB	Vero Beach

119.825 - MLB	132.350 - SRQ
121.500 - ZMA, AVO, FK7 and emergency use worldwide	132.400 - MIA
	132.450 - PHK
123.925 - GTK	132.950 - BHF
124.100 - MLB	133.200 - ZMA
124.700 - MIA	133.275 - FMV
124.750 - EYW	133.400 - PBI
124.825 - FMV	133.500 - EYW
125.075 - VRB	133.550 - PHK
125.700 - ZQA	133.850 - MIA
126.275 - FK7	133.900 - SRQ
126.525 - AVO	134.200 - BHF
127.200 - AVO	134.550 - AVO
127.225 - FK7	134.600 - MIA
128.175 - MIA	134.750 - FMV
128.225 - SRQ	134.800 - ZQA
128.650 - MLB	135.075 - MLB
132.150 - PBI	135.175 - PBI
132.200 - EYW	135.200 - GTK
132.250 - VRB	135.225 - MIA
132.300 - GTK	135.700 - VRB

Well, that's all for April - no fooling! See you in May with more Plane Talk news and views.

Low Power FM

The FCC has created a new radio service – and with it, a fair bit of controversy. Low power FM services (LPFM) will open opportunities for small communities and neighborhoods to have their own radio stations, but only if the Commission's January 20 decision stands.

From the late 1940s through the late 1970s, the Federal Communications Commission (FCC) offered a Class D FM license. These noncommercial stations were allowed to use a maximum of 10 watts of power and were exempt from many regulations applicable to higher-powered stations. Because of their low power, these stations could be built relatively close together and close to other stations of higher power. Most were operated by high schools and colleges. In the late 1970s, in an attempt to open more channels for high-power public radio stations, the Class D license was phased out. A few such stations survive today, but only as "secondary" services. They can lose their frequencies to higher-powered outlets.

Since then, commercial radio has changed immensely. Almost all regulation of program content has been repealed, and restrictions on the number of stations that may be owned by one company have also been largely removed. Radio has become a heavily-researched big business. Some groups feel they have been left out.

The first result was a rash of unlicensed "pirate" operations. Most cities of any size have had at least one unlicensed station operating in the last five years. Almost all of these illegal stations have been programmed locally, by people residing within the coverage area of the transmitter. Of course, these operations were in violation of federal law. Many have been shut down by the FCC.

In 1997, two petitions were filed asking that the FCC reestablish a legal service for broadcasting at powers of less than the Class A limit of 100 watts. Last summer, the Commission agreed to consider the issue and released several proposals for LPFM operations. On January 20 of this year, by a 4-1 vote (with partial dissent from a second Commissioner), the FCC approved two classes of LPFM.

LP-100 stations will have a maximum power of 100 watts and a coverage area of about 3-1/2 miles. LP-10 stations will operate with between one and ten watts and cover about 1 to 2 miles. All existing FM channels may be used. Four-letter callsigns with an -LP suffix will be issued.

The stations will all be noncommercial and will be licensed to local governments, educational institutions, and local public-safety or transportation services. Other regulations will

prohibit existing broadcasters from programming LPFMs; will require that the station be within 10 miles of the headquarters of the organization owning it; and will prohibit one entity from owning more than one LPFM in the same community. For the first two years of LPFM, an entity may only own one LPFM station nationwide; this number will gradually increase to 10 over a 3-year period. LPFM licenses will be issued for eight-year renewable terms. They may not be bought or sold.

In cases where there are two or more applications for the same frequency in the same community, a point system will be used. Points will be earned by organizations that have existed



This map shows the approximate coverage area of a 100-watt LPFM station in midtown St. Louis.

in the community for at least two years, for pledging to operate at least 12 hours a day, and for pledging to air at least eight hours of local programming daily.

In cases where more than one applicant has the same number of points, the FCC will propose granting several applications and requiring them to share time on the same frequency. If all else fails, groups of applicants will be awarded successive nonrenewable licenses. (If there are four mutually-exclusive applicants, applicant A would receive a license to operate from 2000 to 2002; applicant B would operate from 2002-2004, etc.) LP-100 licenses will be offered first; once these applications have been acted on, LP-10 licenses will be offered.

LPFM stations must comply with the same minimum-schedule regulations that apply to full-power noncommercial stations (36 hours per week). Most of the nontechnical rules – callsign identification, political programming, obscene programming, etc. – will apply to these stations. They will also be required to participate in the

Emergency Alert System. Main studio, ownership report, and public file regulations, however, will not apply.

Additional information on LPFM will be available on www.fcc.gov/mmb/prd/lpfm, or at 1-888-225-5322.

■ Congressional Obstacles

But all of this may be irrelevant. Existing broadcasters are steaming mad at LPFM. They feel it's unnecessary, will generate unfair competition, and will interfere with their signals. Rep. Oxley of Ohio has introduced a bill in Congress that would prohibit the FCC from licensing low-power FM stations and would rescind any licenses that had already been issued. I have not seen anything about a lawsuit against the FCC on this issue, but with the heated opinions being expressed, I would be surprised if such a suit isn't filed. Don't count on hearing any LPFM stations anytime soon. (But don't be surprised if you *do* hear some!)

I'm already hearing FM DXers cry "foul." There have been complaints that LPFM will be the end of FM DXing. We heard the same thing about TV DXing when the low-power TV stations were introduced in the early 1980s. (And we heard it about AM DXing when the clear channels were broken down, and when the power limit on the "graveyard" channels was increased to 1,000 watts, and...) DXing will be different in the LPFM era, but it will still exist.

■ Bits and Pieces

Ross Smith near Baltimore enjoyed "Propagation by Groundwave" in the January issue of *MT*. He visited the Outer Banks of North Carolina in May of 1998 and was surprised by the strong daytime AM groundwave signals heard there. Baltimore stations WCBM-680 and WBGR-860 were both strong, and WBAL-1090 came in well all the way to Cape Hatteras, 280 miles from Baltimore. The major New York City stations WFAN-660, WOR-710, WABC-770, and WCBS-880 were also easily heard there, 400 miles from NYC.

The Outer Banks have long been a popular place for FM and TV DXers, due to the long ducts that form over the coast. But a look at the map shows the area should also be an excellent place for AM DX.

Are there any interesting low-power catches in your log? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!

Mixed Reactions to Low Power FM

In late January the Federal Communications Commission approved a proposal to license low power FM stations in the United States. The service will be noncommercial, with the new stations protecting first, second, and third adjacent channels already licensed in the FM broadcasting band. A license application process is anticipated later this year.

Predictably, opponents such as the National Association of Broadcasters quickly announced litigation to block the move. More surprisingly, reaction in pirate radio circles was mixed, partly because of a provision that pirates who broadcast after February 26, 1999, will be ineligible to apply. Other interest groups, such as the *Call and Post* black newspaper chain in Ohio, editorialized against the fact that the new stations will not be commercial. Despite the diverse views, this FCC action significantly changes FM broadcasting in the United States.

■ Mexican Clandestine?

Our readers sent multiple reports of a new clandestine from Chiapas, Mexico, known as **La Voz del Zapatista**. The station has made many appearances since its first broadcast on January 24, always using 6955 kHz right in the North American pirate band. The Spanish language fare on this one, from Commandante Null, promotes the cause of Chiapas rebels against the Mexican government.

However, as Hans Johnson of *Cumbre DX* quickly pointed out, this show originated as a scheduled broadcast on **Radio for Peace International** in Costa Rica last spring, with Mike Adams of Atlanta's Information Associates responsible for production. A pirate transmitter has been periodically relaying a Real Audio feed of this show, which you can hear for yourself via the <http://www.mindspring.com/~exomike/> URL.

If you're starved for Western Hemisphere clandestines, several of our readers note decent reception of the morning broadcast of the Colombian rebels' **La Voz de Resistencia** on 6261 kHz around 1130-1230 UTC. Their afternoon show, also on 6261 kHz but around 2145-2230 UTC, is a much tougher DX catch.

■ What's on the Air

Here's the crop of North American shortwave pirates heard this month by *MT* readers; let us know what YOU have logged! Nearly all stations operate within 10 kHz of 6955 kHz. Another place to check for daytime pirate activity is the region around 13910 kHz. Radio Free London has been heard in North America on 15060 kHz around 2000 UTC.

Action Radio- A. J. Michaels says that he has retired this ID, but he plans to be active as a program provider to low power FM stations. (Pittsburgh)

Blind Faith Radio- Classic rock with host Dr. Napalm. (Merlin)

Indira Calling- Harold Krishna's parody of DXing uses Calcutta as its context. (Providence)

KAMP- Rock and soul music, plus cameos from other pirates, are the fare from I. M. Nutz. (Blue Ridge Summit)

KMUD- Best heard on the west coast, the variety music on this one is great DX elsewhere. (Lone Pine)

KRMI- Radio Michigan International now mixes comedy with its rock music. (still None)

Radio Bingo- The radio bingo game now comes mixed with cuts from other pirate programs. (None)

Radio Nonsense- As our picture shows, reruns of

has no eyes, and thus can't read reception reports. (None)

WACK- Top 40 and classic rock tunes are hosted by professional DJ's. (uses wackradiomail@juno.com e-mail)

WBIG- Big Mike's rock music has recently featured cameo ID's by Fearless Fred of Radio Garbanzo. (Belfast)

WMOE- Comedy and rock are sandwiched around Three Stooges music. (Uses wmoe6955@yahoo.com e-mail)

WHYP- James Brownyard gives the weather and grunts along with rock music tunes. (uses whyp1530@yahoo.com e-mail)

WBIG- Big Mike's rock music has recently featured cameo IDs by Fearless Fred of Radio Garbanzo. (Belfast)

WMFQ- The QSL promotion station says that they will verify, unlike some others that are a waste of stamps. (Providence)

WRX- Jimmy the Weasel's "singing" and commentaries on the sorry state of his listeners are now legendary. (Manomet)

■ Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 1464, Manomet, MA 02345; PO Box 293, Merlin, Ontario N0P 1W0; PO Box 25302, Pittsburgh, PA 15242; and PO Box 928, Lone Pine, CA 93545. Some stations verify logs in *The ACE* bulletin (\$21 via PO Box 15830, Chesapeake, VA 23328) or in *Free Radio Weekly* (free to contributors via yukon@mdn.net).

■ Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by John T. Arthur, Belfast, NY; Shawn Axelrod, Winnipeg, Manitoba; Artie Bigley, Kansas City, MO; Ranier Brandt, Hofer, Germany; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Charles Crawford, KY; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Paul Griffin, San Francisco, CA; Sheldon Harvey, Montreal, Quebec; William T. Hassig, Mt. Prospect, IL; Vince Havrilko, Beale AFB, CA; Peter Lautzenheiser, Wooster, OH; James Mannheim, Ann Arbor, MI; Bill McClintock, Minneapolis, MN; Greg Majewski, Oakdale, CT; Al Quaglieri, Albany, NY; Adrian Peterson, Indianapolis, IN; Michael Prindle, New Suffolk, NY; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; DJ Stevie, Basel, Switzerland; B. L. Williams; and Niel Wolfish, Toronto, Ontario.



their shows have been a memorial to the deceased Joe Mama. (None)

Radio Three- Sal Amoniac spins rock tunes and novelty music. (None; QSL's logs in *The ACE*)

Radio Tornado Worldwide- Dr. Tornado's Metallica has been less active lately, but his parody is still around. (None)

RBCN- Radio Bob's Communications Network features original southern humor. (Lula)

The Crooked Man- Their crazy announcer says that he hit his head falling out of the Hindenberg Zeppelin. (None)

Voice of Bono- Gary Daniels has returned with his rock music and pirate scene commentary. (Belfast)

Voice of Captain Ron SW- Several readers, from as far away as Europe, report QSLs from this rocker. (uses CaptainRonSWR@yahoo.com e-mail)

Voice of Green Acres- The shows endlessly repeat the TV show theme, claiming to be the worst pirate in the world. (None)

Voice of the Inky Pen- Their announcer says he

Buttoning Up the Natural Radio

It works! – My BBB-4 Receiver, that is. In case you're just joining us, we're picking up where we left off last month with the construction of a Natural Radio receiver. This simple device can be built entirely from Radio Shack parts, and based on my early findings it appears to be an excellent performer. In fact, it rivals the performance of any commercial model that I have tested.

Before going too far, I want to make two minor corrections to the schematics presented last month. First, electrolytic capacitor C9 should be labeled 100 uF (microfarad), *not* pf (picofarad). You deserve a special award if you *were* able to find a 100 pf electrolytic capacitor, because they are not commonly available. Also, in the Audio Preamplifier circuit, Resistors R5 and R6 should *connect* to the audio input line, not just cross over it.



Figure 1.. It's not fancy, but it does the job. This view shows the circuit board and other parts mounted inside an aluminum enclosure (Photo by Chuck Bliley, NY).

■ Home Stretch

So how are you coming with your receiver? Let's assume you've already populated the perfboard, or are about to finish this phase of the construction. The next step is to mount the board and other items inside the enclosure. Before doing this, I recommend taking some time to re-check your wiring. In my case, I accidentally hooked C8, the output coupling capacitor, to a ground point instead of Q2's collector. It was an easy mistake to make, but the circuit definitely would not have worked this way. The moral: double check everything!

Before drilling any holes, give some thought to how you want to arrange the parts (perfboard, antenna and 9V battery) in the box. You may also

want to add some "extra" items. For example, I decided to add an on/off switch and a mini-phono jack on the end panel of the enclosure. Although not mandatory, the switch provides an easy way to disconnect the battery, and the phono jack provides a means to connect the receiver to an outboard speaker-amplifier (see last month's text).

After deciding on a layout, I mounted the switch, mini-phono jack and antenna, making sure to insulate the antenna rod from the enclosure. Next, I marked the four holes for the circuit board using a fine point marker. After drilling the holes, I mounted the board using tubular spacers and nut and bolt assemblies. A strip of Velcro® was used to mount the battery inside the box. (Metal brackets are also available for this purpose.)

The only remaining task was to wire the switch, jack and antenna rod to the appropriate points in the circuit with short pieces of hookup wire.

■ Checkout

Old timers call this part of a project the "smoke test," but you won't be seeing any smoke with a low voltage, solid state circuit such as this. It will either work or not. Fortunately, testing the unit is simple.

Turn on the speaker-amplifier (low volume), extend the antenna, and then turn on the receiver. You should immediately hear a loud hum from the speaker-amplifier. This is the 60 Hz powerline hum that will be very strong in almost any developed area. Touch the antenna rod, and you should hear a pronounced change in the hum volume. If your receiver passes these tests you can be quite sure it is working properly.

■ Hearing the Good Stuff

Now that you've used hum to verify the BBB-4 is working, you'll probably spend the rest of your listening career trying to get away from it. Powerline hum masks all but the strongest natural radio signals, so it's essential to get away from AC lines if you are to succeed in hearing anything meaningful.

I found a spot in my backyard, about 400 feet from a powerline where the hum dropped to an acceptable (yet still audible) level. An open space, such as a park or ball field might also be worth a try. The best advice is to try several different locations until you have a selection of "quiet" sites to listen from.

I tested my unit on a clear, cold night. As I trudged through the snow, I could hear the static I was generating with each step. (Another sign that the BBB-4 was working well.) Once I found the "sweet spot" in the backyard, I was able to hear a variety of Tweaks and Pings coming from the speaker. Conditions were not prime for hearing Whistlers on this night, but I'm sure that will come at another time.

Without getting too "mushy" about it, I have to say that there was something very special about listening to these sounds on a clear night, with an

occasional shooting star gracing the sky and the hoots of a nearby owl punctuating the air. It is something you must experience to fully understand.

There is much more we could discuss about Natural Radio, but for now you can get used to using the BBB-4 and check out the many sources of information that exist on the web. I highly recommend LWCA's web site (www.lwca.org/) and Stephen P. McGreevy's site (www.triax.com/vlfradio/natradio.htm). They are loaded with useful tips and sound samples of natural radio signals.

Warning: NEVER use this (or any other natural radio receiver) when there is lightning occurring in your area.



Figure 2. Here's a view of the completed BBB-4 ready for action. I used two strips of Velcro® to attach the outboard speaker-amplifier to the front of the case, and a short patch cord to link the BBB-4 to the amplifier input. (Photo by Chuck Bliley, NY).

Stop Press

Just as I was finishing this column, word came from Frank Reynolds (Rome, NY) that a brand new beacon has taken to the air – **TST/220 kHz**. He reports that it is extremely strong there, and Jacques d'Avignon (Peterborough, ONT) is also hearing it during daylight hours. Efforts to locate the beacon are continuing and we'll report any news here. Reception reports would be appreciated.

What? You (still) don't have a computer?

I talk to a lot of hams who still do not own a computer. Most of the excuses I hear are "no money" or "not interested." If you are not interested in using a computer, I say you should be. A computer can make hamming a lot more fun. Keeping records, log books, word processing and a wide variety of programs are available that will help expand your horizons.

Many folks I talk to are concerned about learning how to use a machine, and I must say this is a legitimate concern. Computers do pose a variety of problems depending on the application they are used for. In most cases, however, getting up and running is fairly easy. Most of the time a simple yell for help on the local repeater will bring a lot of your fellow hams to the rescue.

There are a variety of books available, too: two that I use are *DOS for Dummies* and *Windows 95 for Dummies*. Both books are available at the local book or office supply store for under twenty dollars.

■ Price

Today, computers are cheaper than ever. If you can afford it, get yourself a machine with 64 meg of RAM, 300 MHz or better speed, and largest hard drive offered. Machines of this caliber are offered at about \$1200 as a complete system, usually including a monitor and a lot of software already loaded and a large bundle of CDs with plenty of neat software.

More than one ham has said, "You're crazy if you think I will spend that much." There are solutions for that ham, too. Used machines can be had for a few hundred dollars. If you want to use the internet, expect to spend \$250 or more for all you need with a used machine. For \$500, it is possible to have a deluxe computer with all the accessories that will be useful for years to come; just take someone along when you look.

I recently purchased a used lap top (Epsom) for 25 dollars at a local hamfest. I wanted a compact machine that would sit on the shack desk, and the lap top was perfect. Of course this machine is a 286 and runs real slow, and the battery pack is dead, but I do not need the pack as it runs on 120 Vac in the shack. If I do want to use it as a portable, building a battery pack from rechargeable batteries should cost about 20 bucks.

This machine does exactly what I need: I have installed a wordprocessor, log book, propagation program, and HamCalc on it. Yes, it does run in DOS and it will take half an hour or so to learn everything you need to run the machine. But DOS programs are cheap and plentiful, and almost anything you want to do is available in DOS. I see other laptops at hamfests running in the same price range, and 486 machines with color monitors are available for a hundred bucks or so.

■ HAMCALC 41

George Murphy VE3ERP has been compiling handy amateur radio programs for a number of years and offering them on a disk for a price of

five dollars US. The latest Hamcalc has nearly 200 programs on it. Almost anything that can be put on a disk is here. Programs for antennas, calculations, winding inductors of all types, feed lines, transformers and others too numerous to mention – but all worth while. I use this disk a lot, especially for designing antennas.

Hamcalc runs in DOS and requires GWBASIC. GWBASIC is available on most older versions of MSDOS. If you can't find a copy locally, it is available from VE3ERP for five dollars. I suggest ordering it when you order HamCalc.

If you are an active ham and have a computer, Hamcalc is a "must have." Order yours from VE3ERP, George Murphy, 77 McKenzie St, Orillia ON, L3V 6A6, Canada

■ ARRL Asks Reconsideration on Restructuring

The ARRL has wisely requested the FCC to reconsider its position on dealing with technician licensees upgrading for HF. Presently a Tech must be licensed prior to February 1991 before receiving credit for passing a code exam. After that date, it is up to the licensee to provide proof of having passed the code exam.

The present FCC database lists tech plus with a "T" and no code with a "P". Under the new rules, all would be lumped under the heading Technician and proof of having passed a code test would be up to the individual.

The ARRL requests the FCC maintain the present database instead of changing to the new system.

■ Radio Shack HTX 10

My review of the HTX 10 in the February issue sparked a lot of commentary from readers. I have received quite a few email and snailmail letters asking questions about the rig.

First let me say, I will answer your queries to the best of my ability. However, I do not have all

of the answers on this or any other piece of gear. It's best to contact Radio Shack directly. Ask at your local store: they will gladly give you addresses, phone numbers and e-mail addresses.

My experience with the HTX 10 has been very positive. I have enjoyed many contacts on all modes except CW using the HTX 10 and would recommend it to anyone looking for a decent ten meter rig. I might add, if you come up with good CW mod, please send it to me for inclusion in this column.

One reader suggested forming a users group on the Web. If you are interested in joining such a group, contact KA2CAG, Walter Paluch, at WalterP101@aol.com


■ The Bands are Hot!

Without question the bands have been hot this past season. I get loads of comments on good openings on six meters. N3JPU wrote a very informative e-mail telling me of his activity in the Washington DC area: he worked state number 45 (New Hampshire) on 50.400 AM and lots of DX this past winter. Ten, twelve and fifteen meters are alive with DX daily and two meters has had its share of DX over the winter, too.

I can copy N7LT beacon (28248.2 kHz) in Bozeman, Montana, frequently when he is transmitting with only 50 mW. With one watt of SSB on ten meters, all continents were worked from here while using a 5/8th wave vertical this past season. I am only eight countries away from DXCC (100 countries) with one watt on SSB, and hope to complete that before this cycle ends.

■ Looking for Circuits

I am looking for easy-to-build circuits to include in this column and in a small book of projects that I am planning. If you have projects of transmitters, receiver accessories, antennas or anything useful to hams, please send it along to me. Any devices are OK – tubes, transistors, IC or what have you.




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Antenna Design Programs

There are various ways of designing practical antennas. For instance, it is possible to construct a miniature model of the antenna, test it at the higher frequency appropriate to its shorter elements, and apply the results to build the desired antenna at the frequency originally intended.

A less expensive and easier alternative to physically building models is the use of what is called "mathematical modeling." This can be as simple as solving by hand the design formulas given in antenna handbooks (such as $468/\text{freq in MHz} = \text{length of a halfwave dipole}$) to determine antenna-element length, spacing, and so forth. Or, there are programs which utilize a computer essentially as a programmed calculator to compute length and spacing data for you.

A more complete antenna-modeling aid includes using a computer program not only to calculate the antenna's dimensions, but to show detailed drawings of the antenna and give information on how to construct and use the antenna.

The most sophisticated approach is the use of a computer program which will compute element lengths and spacings, taking into consideration the antenna's proximity to the earth, type of earth, and other factors. Such antenna-modeling programs intended for SWLs, hams and experimenters invariably utilize MININEC as their computing engine.

With MININEC the programs can calculate antenna impedance, SWR, display a line-drawing of the antenna, and a graphic representation of the antenna's radiation and reception patterns. These programs typically have some preprogrammed antenna designs in their files; generally they have no information on construction and utilization of the antenna.

MININEC-Based Programs

MININEC is a powerful antenna-modeling program which can be used "as-is." This is difficult, however; it is limited to persons fluent in both antenna theory and computer programming. For the MININEC-based programs discussed below their authors have utilized MININEC as the com-

puting engine for their program, then added subroutines and aids such as menus and graphics. This makes their programs more user-friendly than is MININEC by itself.

When using these programs the user defines the desired antenna's elements by inputting the appropriate X,Y,Z coordinates (as you learned in solid geometry) for each individual element or element segment. Once the antenna elements and other information such as frequency of operation, type of ground, signal sources, and antenna loads have been entered, the payoff begins.

These programs can display a 3-D line drawing of the antenna, 3-D graphic showing the radiation and reception patterning of the antenna, as well as separate azimuth and zenith plots of the antenna's predicted performance. Also available are standing wave ratio (SWR), gain, feedpoint impedance, current, and a great deal more. Actually the programs offer more features than we non-antenna-engineers will ever learn to use.

ELNEC® and its more powerful brother EZNEC® are antenna-modeling programs which have found much favor with technically-inclined SWLs, experimenters, and amateurs interested in antenna design. Both programs have all the useful features mentioned above for MININEC-based programs, and much more.

Hardware requirements are an IBM PC-compatible with a 386 or higher microprocessor with coprocessor; at least 3 MB of available extended RAM; and EGA, VGA, or SVGA graphics adapter. Plots print on HP LaserJet®, color or monochrome HP DeskJet®, or Epson-compatible dot-matrix printers. EZNEC is a DOS application which can be run under Windows®, Windows 95®, or WindowsNT®.

For a hands-on evaluation of these programs check out the free demo copies at <ftp://ftp.funet.fi/pub/ham/antenna/elneccdem.exe>, or for more information write: Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, OR 97007, U.S.A.; phone (503)

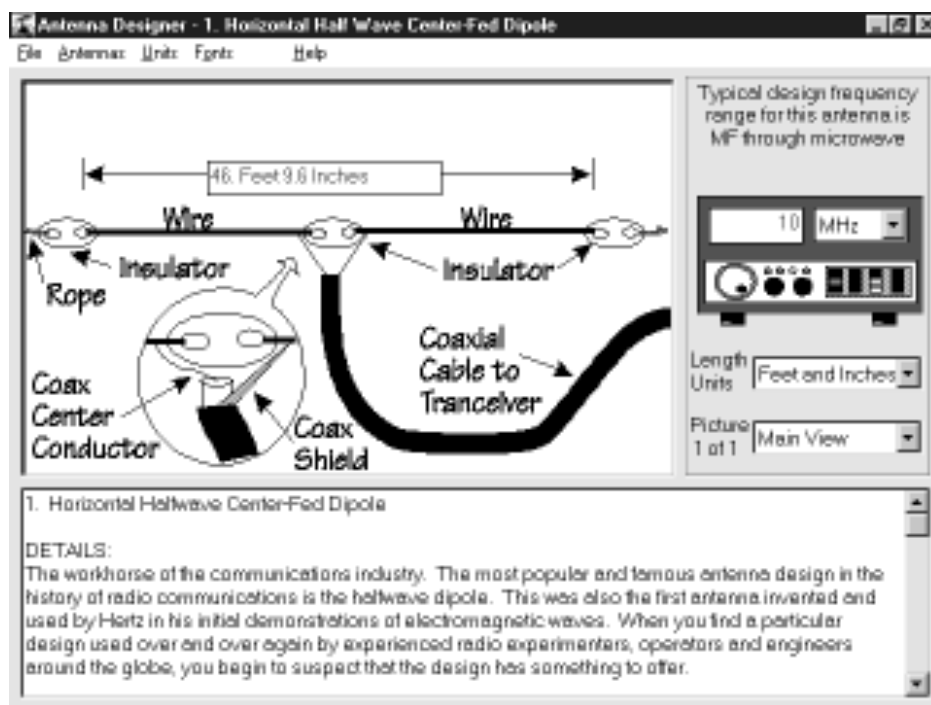


Fig. 1. A typical, preprogrammed, on-screen antenna drawing from Antenna Designer.

646-2885; email <w7el@teleport.com>. ELNEC is priced at \$49, and EZNEC is \$89.

■ NEC4WIN95®

This useful and more recently available program has all the features described above for MININEC-based antenna-design programs and much more. It is likely to develop a following among the technically-inclined SWLs, experimenters and hams.

Hardware requirements are a 386 PC (486 or a Pentium recommended), a minimum of 4 Mbytes of memory, Windows 3.1 or Win95, and it should function with most types of video cards and graphic printers supported by Windows. The address for more information is ORION Microsystems 197 JONCAIRE, Ile Bizard Quebec, Canada H9C 2P7

Just as with ELNEC and EZNEC you can download a free NEC4WIN95 demo copy <www.cam.org/%7Emboukri/n4wpage.html> for hands-on evaluation. NEC4WIN95 is priced at \$60.

■ A Non-MININEC Program

Antenna Designer* is a user-friendly, windows-based program which is preprogrammed with 17 popular antenna designs. It also has on-screen instructions for constructing each antenna and information on antenna utilization. When a design from the Antenna Designer menu is selected, a detailed drawing of that design appears on the monitor screen. Enter the desired frequency of operation, and the antenna's element size and spacing is displayed on the drawing. Because this program deals only with its preprogrammed designs there are no X,Y,Z coordinates to enter.

One useful feature of Antenna Designer is that you can quickly and easily try a favorite frequency across the program's various antenna designs to see which designs best fit the space you have available for erecting antennas. Alternatively, you can quickly switch between different frequencies using one design in order to see how different frequencies affect the size of that antenna.

The program essentially combines the convenience of computer-calculated element lengths and spacings with an antenna manual of how-to-construct-it, and how-to-use-it information.

Minimum System Requirements are a Pentium® or better CPU, 16 Megabytes of RAM, 10 Megabytes hard disk space, Microsoft® Windows 95 or 98, and VGA graphics. You will also need a Windows compatible printer capable of printing graphics if you want to produce hard copy of your designs.

Antenna Designer is available for \$39.95 plus \$5.00 S/H (CA Residents add 8.5% sales tax) from Small Planet Systems, 623 Mangels Avenue, San Francisco, CA 94127. Phone: 1-415-337-9394. Check the web at <www.smallplanetsystems.com> for more information.

■ Closing Comments

In some instances the antenna designs obtained by use of any of the above programs perform as intended. In others some adjusting of the antenna's length, spacing, height above ground, etc. may be necessary to obtain the desired performance. As you would expect, the MININEC-based programs, with their consideration of environmental effects, are more likely than other programs to produce an antenna which needs no adjustment to function as designed.

This Month's Interesting Antenna-Related Web site: <www.cebik.com/nec.html>. This site has descriptions of a number of antenna modeling programs for various applications and of varying levels of sophistication.

RADIO RIDDLES

Last Month:

I asked if you had noticed that I had said that matched conditions generally make for better communications? This implies that sometimes matched conditions between antenna and feedline don't necessarily improve communications. How could this be?


Actually there is very little loss in amount of power radiated from the antenna when mismatch is not too great. In some situations, even with an SWR as high as 10:1, loss may be acceptably low if transmission-line loss is low.

For receiving, below something like 20 MHz, generally there is a fair amount of received noise. Due to this the level of received signal that reaches the receiver input is often less important than the received-signal-to-received-noise ratio in determining quality of reception. So the effect of mismatch between circuits depends on more than just the degree of mismatch.

This Month:

In the past we have sometimes mentioned "non-resonant" antennas. Are these antennas all just mistuned, wannabe resonant antennas? Or are some antennas intentionally designed to be non-resonant?

*Antenna Designer is based on material from W. Clem Small's *Antenna Handbook* (thanks to Grove Enterprises for permission to reprint this material).



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The Screen Grid Revolution

At the end of last month's column, I mentioned that this time we were going to focus on how radio receivers began to change as manufacturers sought to organize radio production for greater economy. However, I was getting a little ahead of my story. Before doing that, I need to cover an important vacuum tube innovation that came in 1929 – just a few years after introduction of the first a.c. sets consigned battery receivers to our attics and trash cans.

■ The Triode Feedback Problem

Readers of the February column will recall my discussion of the methods used by radio manufacturers to minimize the annoying feedback that took place in the triode r.f. amplifier stages of early TRF (tuned radio frequency) receivers. Since any TRF worth its salt had at least three of such stages, this was a problem of some dimensions. Those who chose to afford it, licensed the elegant "Neutrodyne" solution developed by Professor Hazeltine of Stevens Institute of Technology and popularized by the Freed-Eisemann Company. Other manufacturers got around the problem simply by degrading the performance of their sets.

The feedback problem was caused by the large internal grid-plate capacitance of the existing triode tubes. But during the late 1920s, experimenters working in different countries discovered, almost simultaneously, a method of effectively reducing this capacitance by several hundred percent. The method involved adding an extra grid between the original grid and the plate of the triode.



Fig. 1. Type 24-A was the first widely-used screen grid tube.

■ Introducing the Screen Grid

The new grid was a cylindrical element formed of fine-mesh wire screening. When maintained at a voltage that was positive with respect to the tube's filament or cathode (though generally quite a bit less positive than the voltage on the plate), the grid exhibited an "electrostatic shielding" effect that provided the needed isolation between the original grid and the plate. The "screen grid" tubes could be operated at much greater amplification without feedback – offering greatly enhanced sensitivity.

Tubes with this extra "screen grid" were called "tetrodes" – a term derived from a Greek root meaning "four" just as the term "triode" was derived from the root meaning "three." To distinguish it from the screen grid, engineers began to refer to the original grid as the "control grid."

It should be noted, as we begin dealing with tube nomenclature, that the "cathode" (see previous column) – a new element introduced to facilitate a.c. tube operation – does not count as a separate element in tube nomenclature. Both the type 01-A (no cathode) and the type 27 (first tube with cathode) are considered to be triodes.

■ Screen Grid Tube Types

Like the 71-A discussed last time, the first screen grid tube (designated the type 22) was designed for use in battery sets just as battery sets were becoming obsolete. Unlike the 71-A, however, the 22 was could not be pressed into a.c. service. Relatively few of these tubes were made and they are a rarity today.

The release of the first widely-used screen grid tube began in May 1929. This was the type 24, which – like the type 27 – had a cathode and a 2.5-volt heater. Very soon after its introduction it was replaced

with a quicker-heating version called the 24-A. And for several years thereafter, the 24-A was the major representative of the screen grid design.

For some reason, in working out the mechanics of screen grid tube construction, the engineers connected the new grid to the tube base pin that had formerly been assigned to the control grid. The control grid was then brought out to a new type of connection, called the "grid cap," located on top of the tube. Connection to the radio circuit was made by a form-fitting spring clip that slipped on top of the cap.

A New Screen-Grid Tuner

by Glenn H. Brooming and James Miller



Endorsement: "A New Screen-Grid Tuner with the most complete set of features for the radio hobbyist. It is a real 'must-have' for the radio enthusiast. The National Screen-Grid Tuner is a real 'must-have' for the radio enthusiast. The National Screen-Grid Tuner is a real 'must-have' for the radio enthusiast."

Fig. 2. National tuner boasted four stages of TRF amplification. The copy stressed the "tremendous r.f. amplification" of the screen grid tubes.

■ Marketing Issues

For the next few years the screen grid set became the darling of the radio buying public; radio advertising and hobbyist literature incessantly hyped the virtues of this truly important innovation. Sets of the early screen-grid era are readily recognized; they typically have a row of three 24s or 24As with their grid caps connected to the associated tuning capacitor by short lengths of rubberized wire.

I've often thought that, in an era when advances in technology were beginning to capture the public imagination, stepping up to a screen-grid set might have seemed like trading in the old "tin Lizzie" for a supercharged Deussenberg. Those rubber-covered wires connecting the control grids

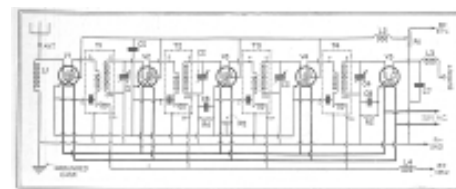


Fig. 3. Schematic of the tuner of Fig. 1. The screen grids (shown by the double grid symbol surrounding the plate) received their bias voltage through volume control R1.

to the tuning capacitor must have helped the illusion – projecting a sense of power and energy similar to the ignition cables of a high-performance car.

The new screen-grid tubes allowed TRF sets to approach the sensitivity of the far more efficient superheterodyne circuit. This kept TRF technology in use a lot longer than it might otherwise have been, allowing manufacturers to avoid paying RCA those expensive superheterodyne licensing fees.

■ Variable Mu Tetrodes

Before leaving the subject of screen grid tubes, we need to touch on an area that may be a little technical for our present discussion but which needs to be included for completeness. Its implications will become clearer to you as you delve deeper into our engrossing hobby.

The unique electrical characteristics of the screen grid tube resulted in an effect (dubbed “cross modulation”) that tended to reduce the set’s selectivity. This was a problem because, by the late 1920s, many areas of the country supported several powerful stations – all broadcasting in the same metropolitan area.

For reasons beyond our present scope, the problem was solved by changing the spacing of the wire spiral forming the control grid from uniform to non-uniform. This not only corrected the selectivity loss, but also made it possible for the amplification of the tube to be smoothly controlled by varying the d.c. voltage applied to the grid.

This, in turn, made possible the design of effective AVC (automatic volume control) circuits. AVC circuits greatly facilitated the tuning of stations of varying strength – preventing powerful locals from overloading the radio while increasing gain to the maximum for reception of weak distant ones.

Tubes of this design are known as “variable-mu,” “remote-cutoff” or “super control” amplifiers. You will run across these terms in tube manuals and other literature – and now you won’t have to wonder what they mean! The new tubes entered the market in 1931.

RCA called its version the type 35, while the essentially identical type released by other manufacturers was known as the type 51. Like the 24, 24-A and 27, they were equipped with cathodes and 2.5-volt heaters. The type 51 was soon discontinued, but

for years after, manufacturers of replacement tubes of this type labeled them “35/51.” Another designation you’ll run into that you’ll now not have to be puzzled about.

■ New Collector Book

Here’s a new radio collector book that came across my desk just in time to discuss in this column. *Machine Age to Jet Age III – Radiomania’s Guide to Tabletop Radios 1930-1962* is the latest in Mark Stein’s ongoing series covering what the author calls “the tabletop radios of the high style era.” Volumes I through III all cover similar time periods: 1933-1959, 1930-1959 and 1930-1962, respectively. The cutoff year of Volume III, says author Stein, was extended to include the later model sets that have begun to attract the attention of collectors.

The organization of the book is as unpretentious as its scope is large. Each radio is represented by a high-quality thumbnail picture captioned with model number and year, cabinet description, tube count, number of bands and estimate of collector value. The sets are grouped alphabetically by manufacturer and, within each group, alphanumerically by model number.

Though I’ve not seen the predecessor books in the series, I’m assuming that they are organized similarly and that the radios are assigned to the different volumes not according to a specific theme, but rather in the order that they come to Stein’s attention. Volume One includes over 1,400 tabletops; Volume Two includes over 2,700; and the current Volume Three includes over 3,000. The combined total included in the three volumes is over 7,000 – all different.

Amazing as it seems that so many tabletop set models were ever produced, the author tells us in his preface that he is hard at work on Volume 4!

Reference material at the front of the book includes the author’s valuing criteria, suggestions for assessing sets prior to purchase, a description of common plastic cabinet material, special considerations in the valuing of wood and plastic radios, and resources for the collector. These reference sections are brief, but carefully thought out and very much to the point.


Besides its value as a price guide, this book is also clearly useful as an identification tool and a key to understanding the

scope of the product lines offered by various manufacturers. Just as obviously, if you buy one of these useful books, you are really committed to the purchase of all three. Otherwise, you won’t have access to the full scope of the material.

Prices and page counts are as follows (all soft cover, 8-1/2" x 11" format). The first price given is retail; the second is a discounted postpaid price for purchases made at the author’s web site (www.radiomania.com): Volume One, 268 pages, \$24.95, \$19.95; Volume Two, 372 pages, \$28.95, \$22.95; Volume Three, 256 pages, \$29.95, \$27.50. The complete three-volume set is available at the web site for \$64.95 postpaid.

■ Bye Till Next Time...

...when, as promised last time, we’ll take a look at how radio designs evolved as manufacturers sought to cut costs and make radio production more efficient.



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The Sony U-ceiver

"Jock, I really appreciated your January *Easy Access Radio* column about 'Sony's Spectacular FRS U-ceiver.' I bought three (@ \$99.95 ea. from K's Mdse., Cedar Rapids, Iowa), which was all they had. They do not plan to restock that item. Perhaps a new model is due out soon.

"I phoned the store first, but the clerk knew it only as the Sony ICB-U655, not the U-ceiver, and told me they didn't stock the item, yet 'U-ceiver' is printed in large red type across the face! Since the product number wasn't mentioned in the article, I had to inquire about the features of the unit he had, to identify it.

"It's a very nice product, and I have only two observations:

1) after 6-hours of 'On' time, without use, the unit shuts completely 'Off' (to conserve batteries. The unit has a 4.5 VDC jack for auxiliary power. When it is used with an AC/DC wall-wart adapter, that cutoff feature isn't needed – and is actually a liability – if the unit is being used as a full-time monitor. I would have preferred an 'On/Off' switch for that feature.

2) the unit has no plain and simple 'Call' key. The only way a 'Call' alert can be transmitted is by having all units of a group set at the 'Search' mode. A plain 'Call' button would have been appreciated for the 'Basic' mode.

"I'm a Sony fan. Their products are usually top-drawer, so I knew this unit would be a 'class-act'."

– James Clifton

Music to my Ears

"As a subscriber to *MT* I wish to compliment you on the February 2000 issue's article on *Using Music to Help ID Short-wave Stations*.

"Many of the pieces played on these shortwave stations are among the most popular CDs on the world music market. But

sometimes one has to look hard to find them in the US popular music shops.

"On occasion the CDs can also be found in the 'used' CD section of music stores, although few people will trade in such great CDs for a fraction of their original cost and lose the music as well.

"Thanks for running this item. I look forward to Bob's follow-up on Pacific and Asian music and I laud *MT* for examining an unusual perspective of shortwave radio."

– Gerry Oliver

GPS Jammers?

"A recent paper at the ION/GPS '99 Conference in Nashville states that 'a hockey-puck sized GPS jammer (4 watts) is being marketed as a commercial item.' The seriousness on this threat cannot be over-emphasized, considering that such a jammer placed on a roof or strewn in a field nearby an airport can deny GPS guidance to any aircraft (or missile) within tens of kilometers of the airport. Think what GPS jamming could have done to us in Yugoslavia!

"Does any *MT* reader know of a handheld scanner covering the L1 frequency (1572.42 MHz) that could be used to detect and DF on a GPS jammer?"

Blanchard Smith, Consultant
2509 Ryegate Lane, Alexandria, VA 22308
(703) 780-2286 bdsr@erols.com

Corrections on the Home Page

An "Additions and Corrections" page can be found at the *Monitoring Times* home page www.grove-ent.com/hmpgmt.html Corrections will be archived so you can always consult that location to see if any errors were found in an electrical circuit before you build it, for example. It will start with January 2000 issue – Corrections to earlier volumes may be added as time permits.

We welcome your letters and emails at Letters to the Editor, *Monitoring Times*, PO Box 98, Brasstown, NC 28902 or mteditor@grove-ent.com

Robert Felton says it's not an exotic QSL, but the caption on the postcard should interest MT readers. A special event station also operated last October from Twin Lights Lighthouse to commemorate this first practical use of a wireless transmission.

CANADIAN BACKSCATTER

Excerpt from Raytheon press release:

Raytheon Systems Canada Ltd. has developed and successfully demonstrated a shore-based, long-range High-Frequency (HF) Surface Wave Radar in collaboration with the Canadian Department of National Defence.

Designated HF SWR-503, Raytheon's surface wave radar is an oceanic surveillance system for monitoring such illegal activities as drug trafficking, smuggling, piracy, illicit fishing and illegal immigration. In addition, it may be used for tracking icebergs, environmental protection, search and rescue, resource protection, sovereignty monitoring and remote sensing of ocean surface currents and winds.

Because of its long-range capability, Raytheon's HF SWR-503 allows a coastal nation to monitor surface and low-level airborne targets up to and beyond its 200-nautical-mile Exclusive Economic Zone.

Portion of a letter to Raytheon, Canadian and US officials, and others:

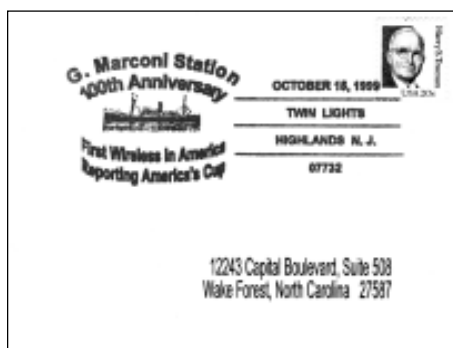
Your new HF SWR-503 radar system for the Canadian Department of National Defence operating between 3 and 6 and 15 and 20 MHz is of concern to me from both a commercial and consumer view ... The HF spectrum is crowded with services that push the envelope on spectrum occupancy now, and we do not need more "noise" added to the mix. Even a low-powered operation with directional antennas on these frequencies at the peak of the sunspot cycle will propagate signals around the world.

It seems incredulous that after the publicity of the then-USSR's "Woodpecker" over-the-horizon (OTH) HF radar system and the ill-fated OTH HF radar attempt by the US Navy (USN), in Maine, that the Government of Canada, the Canadian Department of National Defence, and Raytheon would foist more noise upon the users of the HF spectrum. Sweeping noise pulses by the USSR and USN systems disrupted international broadcasters, coastal marine traffic, overseas aircraft flight communications (including transmitters in Gander) and radio amateur services before pressure was brought to bear to end such services.

I assume the Canadian Department of National Defence and your engineers have considered the damage to existing radio services and how you and the Canadian Government intend to eliminate harmful interference. Compensation alone won't be sufficient when you disrupt emergency and business communications. What steps are you taking to ensure there will be no disruption to life-and-death communications, broadcast services and the amateur radio services?

Isn't there a better solution than to create chaos in the HF spectrum?

– Thomas R. Sundstrom <trs@trsc.com>



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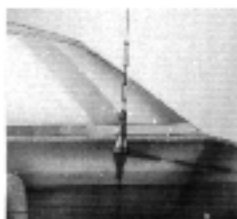
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Pryme's Red-Hot PR-460 GMRS Handi-talkies

It seems that everywhere you look these days, FRS (Family Radio Service) transceivers are popping up like flowers in the spring. I walked into OfficeMax the other day to purchase a cartridge for my printer, and they were selling a couple of different brands of FRS units at competitive prices. A short distance down the road, my travels took me into Wal-Mart, and there I saw full 14-channel FRS units for only \$29.95 each. Suddenly you can buy two 14-channel units for less than you could purchase a single unit just a short time ago.

FRS radios are selling so well because the price is right and because they work so well; it's just that simple. They offer clear audio, ease of use, and no license requirement. If there is one complaint about these otherwise excellent radios, it's that the range is limited. Because FRS units have a maximum power output of one-half watt with no external antennas, the range is generally 1-2 miles, and sometimes it is considerably less.

If you want more range, you need more power and/or an external antenna. Pryme's SportConnect – and ClearConnect – GMRS (General Mobile Radio Service) radios deliver the goods. Both are based on Pryme's PR-460 handi-talkie chassis which measures 4.5 inches high by 2-5/8 inches wide by 1 inches deep. Both offer 4 watts output and the ability to attach an external antenna and come with a wall-wart recharger for the nickel cadmium rechargeable battery. Either unit weighs about 14 ounces with battery and antenna attached.

Both radios have the capability to program 38 different CTCSS (continuous toned-coded squelch system) tones for blocking the reception of unwanted transmissions. The only difference between these physically identical units is the programming, and we'll get to that in just a moment.

The PR-460 chassis is built like the proverbial "brick comfort station." The case is sturdy metal with a standard 12-volt, 600-mAH, plastic-clad clamshell battery that attaches to the back. On the front of the unit is a speaker/microphone grill, four buttons for various functions, and a small liquid crystal display that shows channel number and other vital information.

On the left side of the case is a large, rubber-clad, push-to-talk button, a function button, and a squelch on/off button. On the right side of the case is a tab with a hole for attaching a wrist strap. On top, there is a rubber ducky antenna that attaches to a standard BNC connector, a rubber tab that lifts to reveal jacks for speaker microphones and other accessories, and an on/off/volume knob. On the back of the battery pack there are screw holes for mounting a belt clip and a pair of contacts for use with a drop-in charger. On the bottom of the radio is a slide switch that allows the battery pack to be detached.

That's it – this radio is very, very simple.

SportConnect Features

The SportConnect model offers eight channels of operation. The first seven channels are the seven frequencies that GMRS shares with Family Radio Service. These are:

Channel	MHz (all simplex)
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
Call	462.675 (141.3 CTCSS tone)

In addition, the SportConnect also offers a simplex Call channel which is programmed for 462.675 with a CTCSS (continuous tone controlled squelch system) tone of 141.3. This is the output frequency for the

The Pryme PR-460, as either the SportConnect or ClearConnect, delivers dynamite performance in a solidly built package.

GMRS repeater pair which is designated for emergencies and assistance. This repeater frequency and code combination is the one most often monitored by Radio Emergency Associated Communications Teams (REACT) that have GMRS repeaters. As a result, a call for assistance on the output frequency of that repeater pair might be heard and produce a response.

ClearConnect operation

The ClearConnect model is a 23-channel unit that offers the same radio-to-radio capability as the SportConnect, but also adds the capability of using GMRS repeaters, which can boost reliable range by as much as 25 miles.

The channels covered by the ClearConnect include:

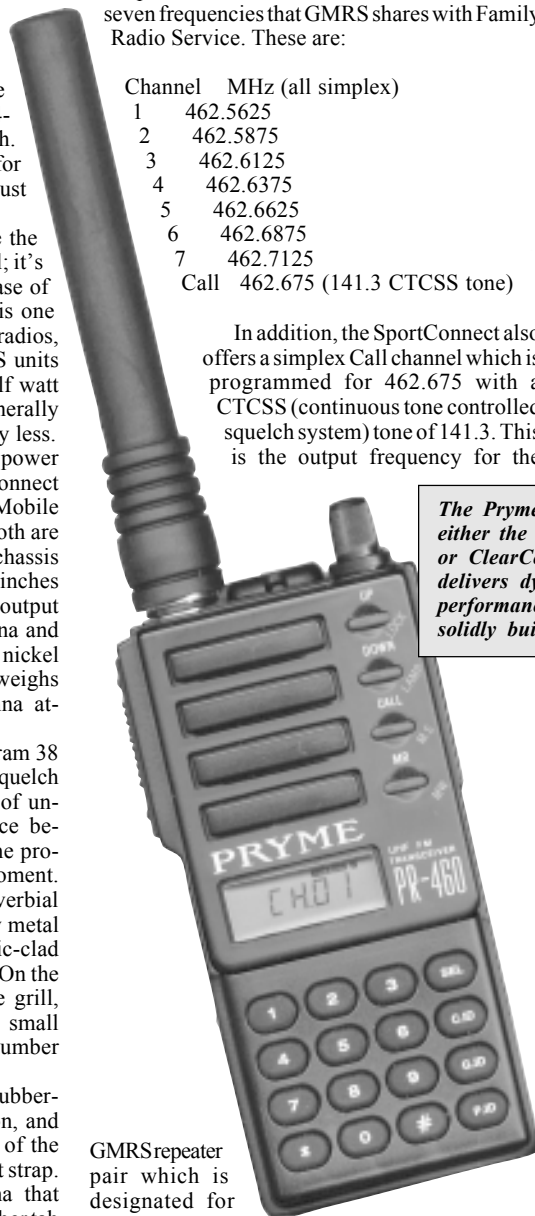
Channel	MHz	Mode	CTCSS
1	462.5625	simplex	
2	462.5875	simplex	
3	462.6125	simplex	
4	462.6375	simplex	
5	462.6625	simplex	
6	462.6875	simplex	
7	462.7125	simplex	
8	462.550	simplex	
9	462.550	repeater	
10	462.575	simplex	
11	462.575	repeater	
12	462.600	simplex	
13	462.600	repeater	
14	462.625	simplex	
15	462.625	repeater	
16	462.650	simplex	
17	462.650	repeater	
18	462.675	simplex	
19	462.675*	repeater	
20	462.700	simplex	
21	462.700	repeater	
22	462.725	simplex	
23	462.725	repeater	
CALL	462.675*	repeater	141.3

*This is the designated emergency and traveler's assistance channel.

The performance of both the SportConnect and ClearConnect is exemplary. In simplex, radio-to-radio communications, these are the best GMRS radios that I have ever tested, offering clear audio and outstanding range. Your ability to access repeaters will depend a great deal on whether you have an external antenna on your vehicle, the sensitivity and location of the repeater, and so forth. In addition, the programming of either of these radios for CTCSS tones is very easy and straightforward. Congratulations to Pryme for a job well done!

Note well: an FCC license is required for GMRS use. Instructions for licensing are included with these radios, and the license application can be filed electronically using the Internet. One GMRS license covers you and your immediate family, including spouse, children, parents, grandparents and more.

The suggested retail price of either the SportConnect or ClearConnect is \$269 each, and a wide range of accessories are available for these radios. Since the price is the same, I suggest purchasing the ClearConnect in case you want repeater capability at some time in the future.



Radio In My Life

By Terry L. Parsons,
tparsons@navix.net

My first clear memory as a child is of my grandfather and a big gray metal box with mysterious dials and lights. Beeps and squawks that, at that time, meant nothing to me, issued from within this contraption. But they were apparently magical sounds, because they filled grandfather with an indescribable joy. After listening to the sounds for awhile, he would pull something made of metal and wood from the corner of the old oak table, and laying his hand lovingly on it, begin to make some of the beeps and squawks himself. At that time, I didn't understand the angelic smile on his face.

It was thus that I inherited my love of radio. It filled the lonely evenings of a suddenly orphaned child with wonder and amazement. I could hear voices from places I knew I could never visit; places whose very names suggest intrigue and romance: names like Moscow, Vatican City, Lisbon, London, and Katmandu. And the names of some of the stations were just as magical: Radio Libertad, Voice of America, Radio Veritas, Radio Zaracay, Voice of the Andes. People I had never met, and never would, became my best friends, bringing to life a world I didn't know.

Almost as exciting as pulling those elusive signals out of the ether was receiving mail from places so very far away. I would run home every afternoon just to see if a new QSL card had arrived. Very often it had, and I prized those bits of paperboard like a miser his gold. And attached to the letters were stamps that were fascinating and strange. I started collecting stamps through radio, another hobby I still pursue avidly. In fact, radio has been such a part of my life, that I often remember dates of events by the radio stations logged that day. One could honestly say that my life is a reflection of radio.

I was only five when I lost my folks in a tragic accident. Grandfather and Grandmother took me in and raised me. They made me as happy as they could. I was only 13 when President John F. Kennedy was taken from us by an assassin's bullet. They dismissed school early that day, and told us to watch TV. But I ran home with tears in my eyes, fired up my old Hallicrafters SX-28, and tuned to VOA. As each hour of that fateful day passed, I stared at the controls and listened and wept. Once again, radio was not only my informant, but my comforter, my companion, my mentor. Radio had softened the harsh blow of loss again.

In high school, I continued to listen to radio, and expanded my hobby to include amateur radio, and police monitoring. I volunteered for Civil Defense and Skywatch. My high school science fair project was a homebrew receiver.

In college, I studied Electronics Engineering. My special passion was antenna design. I worked for radio stations to help pay college expenses, and became a well-known call-in host on the campus broadcast station. And I still watched the mailbox for those QSLs.

I worked in the consumer electronics field for some time, before going to work in the electronics division of a company with government contracts to build missile guidance systems and other tech-

nical devices. But I never lost my love for radio. It was always there to soothe the tension away.

When I became disabled, again radio was my friend and helper. I had many lonely and painful days, and I found radio to be loyal and trustworthy. I never would have made it without radio.

In large part, radio has been my life. At least, it is safe to say that my life would have been very different without it. I still listen to radio with the same rapt attention I did as a child. True, the things I hear may be filtered somewhat by education, wider experience, maybe even a healthy skepticism. But, as I approach my fiftieth winter, one thing hasn't changed. I still love radio in all its aspects. Sometimes, at night, when all is quiet, I put

on the headset, fire up the radio, and begin to twirl the dial, searching for that familiar voice, that ghostly message from the darkness. And you know, if I listen very hard, I can sometimes hear the even, staccato melody of my grandfather's code key. But this time, the beeps, which once meant nothing to me, now say, "You did fine, Son. You did just fine."

The above is the winning essay in a special contest sponsored by the Ontario DX Association. A booklet of all 86 essay entries is available from for \$5 (ODXA, PO Box 61, Station A, Willowdale, Ontario, M2N 5S8, Canada; www.odxa.on.ca)

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* NOTE: The prices shown above are estimated street prices. Actual dealer prices may vary.

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Wellbrook Communications ALA 1530 Loop Antenna

As a larger and larger segment of the population now resides in suburbs, it becomes very difficult to install proper wire antennas in our postage-stamp-size (i.e., tiny) backyards. When I was a teenager a half-century ago, I had a vacant lot of over 5 acres behind my house, so you can imagine what kind of crop sprouted in that field. (I never found out who the owner was!) But today this setting is practically impossible to duplicate. Nor is North America the only part of the world where this situation exists. In Europe minuscule backyards/gardens have been a way of life for many centuries.

It is not, then, surprising that the answer to this lack of a proper space for antennas has now been resolved by a British company, Wellbrook Communications. Among their arsenal of SWL-oriented accessories is an antenna they have designed and built to be installed in small gardens and minuscule backyards. The ALA 1530 can supply your receiver with an excellent signal from LF (low frequency) up to near the top of the HF (high frequency or shortwave) bands.

■ Description and Installation

The ALA 1530 is an active single turn untuned loop advertised as a very efficient antenna between 150 kHz and 30 MHz. I found the specified lower limit of 150 kHz to actually be very conservative, as it was possible for me to hear very good signals at 60 kHz and as low as 30 kHz.

The loop has a diameter of 1 meter (42 inches) and is connected to a junction box containing a fully potted amplifier. This junction box is connected, using a BNC connector, via 50 ohm coax to the control box at the receiver site. The coax can be 100 meters (300 ft) in length and it will not affect the operation of the loop.

How high do you install this loop? To date, I have been using the ALA 1530 on the ground at an elevation of 10 centimeters, and the results have been astounding! As soon as it is possible I will be mounting this loop, with a rotor, about 3 meters above ground. Till now, turning of the loop to various azimuths has been done by hand—not a very efficient method in the middle of the night. All the testing was done while the loop was sitting on the ground (figure 1). The receiver in use is a Kenwood R-5000.

When you install this loop in your backyard, make sure that it is removed as far as possible

from any other HF antennas that you may have. This will prevent interaction between the antennas, ruining the directionality of the loop in the LF and broadcast band (MW), and possibly making the loop deaf to the HF frequency to which your other antenna is tuned.



■ Directional on LF

From my location just northeast of Toronto, in the first three early mornings of testing, I was able to log nondirectional beacons (NDBs) located as far away as Iowa, Manitoba, North Carolina, Texas, Newfoundland and the Arctic, and I was able to clearly hear WWVB on 60 kHz.

This is the first time since I have moved to my present location that I have been able to hear any NDB outside a radius of 100 kilometers. Previously, the heavy level of interference caused by computers, digital thermostats and TVs prevented any interesting listening on the LF band.

At frequencies between 150 kHz and approximately 3 MHz, this loop is very directional: more so at the lower frequencies. This directionality was confirmed during the first three-day testing period and during a recent DXpedition. Some LF signals that were heard very clearly while the loop was pointing one direction were no longer heard or only faintly

heard after the loop was redirected to a different azimuth. Above 3 MHz the directionality is no longer apparent and the antenna becomes omnidirectional.

■ Quieting Effect

This loop is very quiet compared to a wire antenna and this fact surprised many of those who heard the signals captured by the loop during the DXpedition. What causes the loop to be so quiet compared to an ordinary antenna?

The Wellbrook loop reacts mostly to the magnetic component of the wave front and ignores the electric field that carries most of the interference signals captured by a regular wire antenna. When this loop was first installed just outside my office, less than 1 meter away from my computer, there was no computer hash to be heard across the bands and even the hash generated by my very noisy digitized thermostat was barely heard.

In comparison, a wire antenna installed 10 meters away would not allow me to clearly hear a NDB located about 20 kilometers from my home. The wire antenna was also very noisy across the broadcast and HF bands. On HF the Wellbrook loop was not only quieter than my normal wire antenna, but it supplied a stronger and cleaner signal than the signal supplied by the active short dipole that I had been using for many years.

The documentation accompanying the ALA 1530 loop claims that the intercept points for intermodulation at 2nd and 3rd order are, respectively, +70dBm and +40dBm. Not having the necessary equipment to verify these values, I can only say that I have not encountered any intermodulation problems of any sort in the HF band while the loop was installed in the backyard or during a DXpedition. In the LF band there was a mixing signal caused by two local broadcast stations. This mixing signal did blanket about 15 kHz in the 450 kHz segment of the band.

■ Is There a Down Side?

So far this review sounds like an infomercial for Wellbrook Communications. It is not. I have been building and using receiving antennas for more than 50 years and this is the first time that I've felt that a small, easily installed antenna could fill most of my HF and LF needs. The last time I have been so impressed by an antenna was



fig 2. A wood support for the plastic base seemed advisable to support the loop.

when I had access to a large, wideband, 5 to 25 MHz, conical monopole for commercial operations. The price of this large monopole beast was in the vicinity of \$100,000, not counting installation, and the space required was the equivalent of many backyard gardens.

There are two small areas that I would consider redesigning in the construction of this loop, but those two areas of concern would not prevent me from purchasing the loop.

The plastic casing at the base of the loop (figure 2) should be made of a tougher plastic, I found it thin and it should not be used to support the loop. As you can see in the photo (figure 2), a center wooden support was installed to hold the loop and the amplifier.

When the ALA 1530 loop was sent to me, Wellbrook Communications unfortunately did not include the aluminum loop. I made the loop of a solid rod of metal, as tubing was not readily available. Even if aluminum tubing is used for the loop, it is still a fairly heavy piece of metal to be supported by the plastic junction box. There are other methods of building the loop suggested by the manufacturer, but they have not been tried.

My other source of concern is that the designer/builder states clearly in the instructions that the loop amplifier requires a "regulated" 12V power supply. This warning automatically prevents the use of small wall plug power supplies which are not regulated. Even if they are labelled as 12V, they can deliver as high as 18 to 20V with no load. It is difficult to know what the voltage will really be once a load is connected. This high voltage, if it does not drop significantly when a load is connected to the output, could be highly detrimental to (i.e., will fry) the electronics of this loop.

This requirement for a regulated source of power could possibly be avoided, I believe, by installing a voltage regulator circuit in the control box of the loop. Presently the safest power source to supply this amplifier is to use a 12V regulated power supply, or if this antenna is used during a DXpedition, a lead-acid battery could be used. During the DXpedition in which this loop was tested, a "Battery in a Bucket . . . the safe way" (MT January 1999) was used, and the battery was recharged between listening sessions. Because of the high drain, regular dry cells cannot be used.

You can check the Web site <http://www.wellbrook.uk.com> for more information on this product and a few more of great interest to the North American SWL. You might see a notation in the literature or on-line that says that the Wellbrook Communications prod-

ucts are not available in North America, but this is no longer the case.

The ALA 1530 can be purchased directly from:

Wellbrook Communications
Wellbrook House
Brookside Road, Bransgore
Christchurch, BH23 8NA
United Kingdom
E-mail: sales@wellbrook.uk.com

Price, including the loop and shipping is approximately GBP 140 or \$230 (US) Check with Wellbrook for up-to-date pricing and delivery schedule.

P.S.: If you install this loop in your backyard, and the neighbors want to know what it is for, just tell them that you have a contract with the local circus to train wild ducks to fly through a hoop!

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Understanding Intermod

You program 860 MHz into your scanner and hear a signal. Is that signal really transmitting on 860 MHz or are you being fooled? The perfect scanner would hear signals from transmitters transmitting only their programmed frequency, but no scanner is perfect. Our scanners hear signals they shouldn't for a variety of reasons, including images, birdies, spurious responses due to impurities in the local oscillators, and IMD (intermodulation).

We usually measure image rejection and listen for birdies in the scanners we review. This month's focus is on intermodulation, commonly known as "intermod."

Intermodulation is an undesired signal created when two or more signals of different frequencies mix (fig 1). The environment is chock full of radio signals, so why would the signals mix when you don't want them to? A simplified answer is that strong signals can overpower the front end circuitry of your scanner and the front end will mix signals it shouldn't. Signals can also mix outside your scanner, in a corroded coax connector or rain gutter.

While two or more transmitters can mix in several ways to produce intermod, third order intermod is most important to scanner users.

Transmitters on frequencies A and B produce third order intermod signals two frequencies, $2A - B$ and $2B - A$. For example, a NOAA weather transmitter on 162.55 MHz (frequency A) and a paging transmitter on 158.7 MHz (frequency B) may overload your scanner, producing a horrid intermod mixture of weather forecasting and paging tones on 166.4 MHz ($2A - B$) and 154.85 MHz ($2B - A$).

Which of our scanners are more likely to hear intermod due to overload and which scanners are more immune under similar conditions? To obtain quantitative answers, we measured the third order intermod immunity of a few scanners in our collection using a setup described in the *ARRL Handbook for Radio Amateurs* (fig 2).

The test harness uses two calibrated RF signal generators tuned to frequencies 1 MHz apart from each other. They simulate transmitters. Their output is combined together, fed through an adjustable attenuator, then injected into our scanner's antenna jack. An audio voltmeter connected across the external speaker terminals permits us to observe the scanner's level of "quieting."

We adjust the attenuator, increasing the RF signal levels fed to our scanner until it "hears" intermod loud enough to produce 10 dB of quieting. We chose the 1 MHz separation and 10 dB quieting parameters because they are more appropriate to testing scanners than the values used for testing shortwave receivers.

Test results are shown in four bar charts. The models with longer bars are scanners which are the first to hear intermod as we increase the signal strength. Study the 160 MHz chart, for example. A

TRANSMITTER A = 162.55 MHz **TRANSMITTER B = 158.7 MHz**

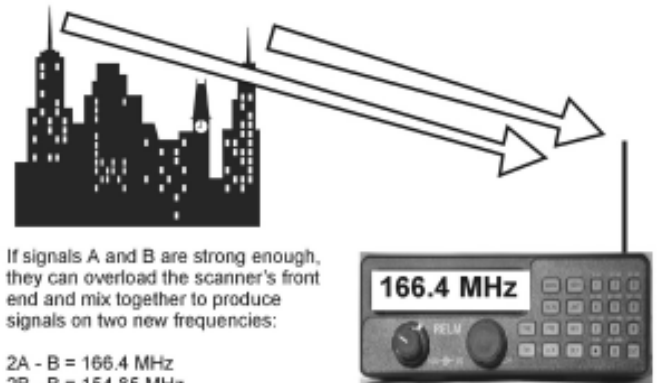


Fig. 1. Recipe for third order intermod

signal level of -65 dBm causes intermod in our PRO-2052, while it requires stronger signals (-46 dBm) to produce the same intermod in our IC-R8500.

Remember that intermod immunity is only one measure of receiver performance. These test results do not take receiver sensitivity into account. A grossly insensitive receiver may exhibit good intermod immunity. Our old BC760XLT scored in the top half in three out of four tests, but it has poor image rejection and harmonics of its local oscillator cause other spurious responses.

PRO-92 Followup

We reviewed a Radio Shack PRO-92 portable scanner in January 2000 *MT*. Aside from the talk group ID "wobbling" between different values and occasional missed callbacks, it worked well on five small, lightly loaded trunked systems in our locale.

We wrote "...Will the good performance 'scale up' when monitoring huge trunked systems? Will the PRO-92 miss more call backs? We cannot answer this question with only small to medium sized trunked systems nearby..."

Jack Anderson's two PRO-92s displayed several problems when tracking busy trunked systems and he documented his findings on a web site (<http://sites.netscape.net/jack22182>). They are paraphrased, with his permission, below:

The decoded Motorola talkgroup ID changes (wobbles or flickers) while a call is being received. [While in the closed mode, the] specific behavior depends on whether or not the "new" ID is in the ID list, and if it is in the ID list, if it

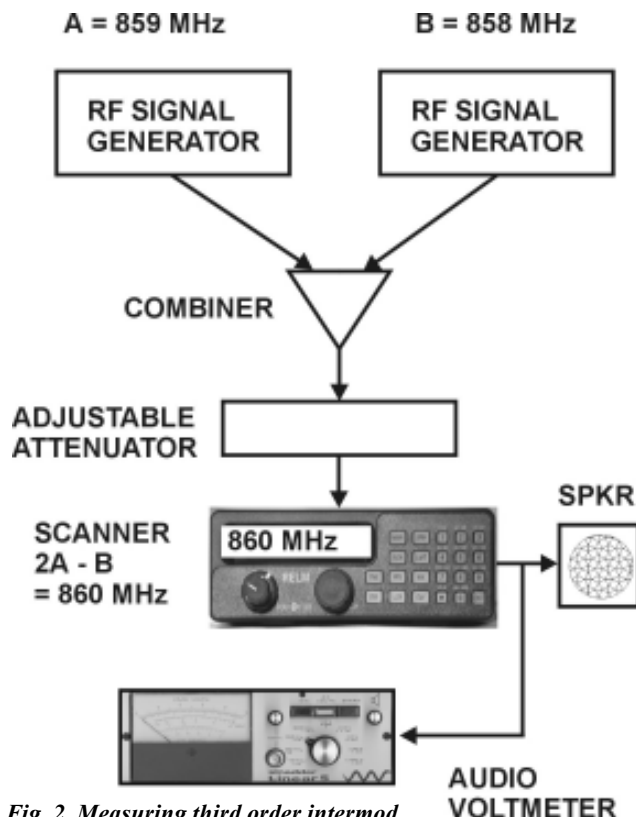
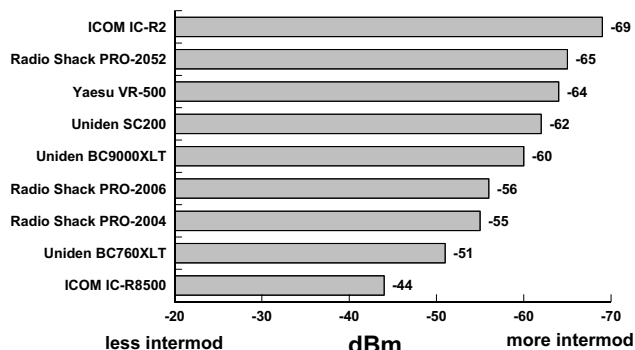


Fig. 2. Measuring third order intermod

INTERMODULATION @ 40 MHz

Signal level at 38 and 39 MHz which produces an intermod product at 40 MHz with 10 dB quieting

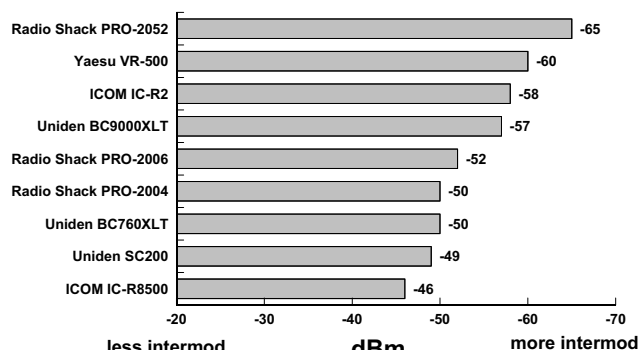


Note: One sample of each model tested.

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INTERMODULATION @ 160 MHz

Signal level at 158 and 159 MHz which produces an intermod product at 160 MHz with 10 dB quieting

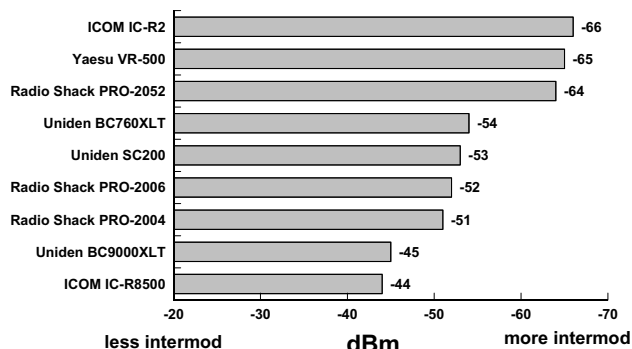


Note: One sample of each model tested.

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INTERMODULATION @ 460 MHz

Signal level at 458 and 459 MHz which produces an intermod product at 460 MHz with 10 dB quieting

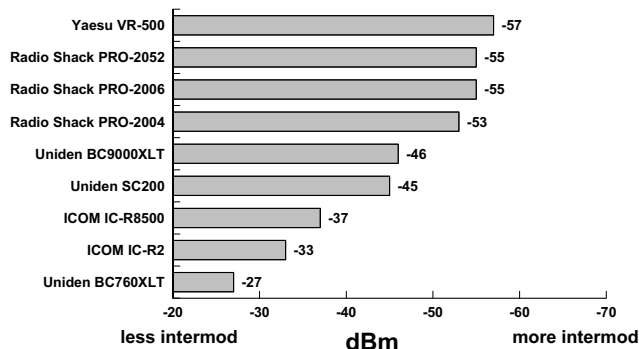


Note: One sample of each model tested.

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INTERMODULATION @ 860 MHz

Signal level at 858 and 859 MHz which produces an intermod product at 860 MHz with 10 dB quieting



Note: One sample of each model tested.

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is locked out or not. If the "new" ID is not in the ID list, the scanner will mute the audio immediately and resume scanning, resulting in the loss of the remainder of the call that was in progress before the "wobble" occurred.

The scanner will frequently interrupt valid transmissions when a "wobble" event occurs. It will sometimes stop on the wrong talkgroup when the incorrect ID is decoded and quickly resume scanning when the correct ID is subsequently decoded. In ID hold mode, the scanner will mute when the "wobble" ID is received, then revert to monitoring the desired hold talkgroup most of the time after the interruption. Occasionally, the display will show the ID or tag of the "wobble" talkgroup, and will remain stuck there, missing all traffic on the hold ID.

When monitoring an LTR trunked radio system in the closed mode, the PRO-92 will stop on a channel with an active RF signal and unmute before it decodes the ID. This results in little "blips" of audio and voice traffic every time the scanner stops on an active channel before the ID is decoded.

When monitoring a LTR trunked radio system in the closed mode, the PRO-92 can fail to unmute on valid talkgroup calls for IDs that are unlocked and in the scan list.

Manually entered Motorola Type I IDs are handled differently than ones that are auto stored. The PRO-92 will not recognize the IDs that were manually entered when scanning in open or closed mode.

When monitoring a Motorola Type I talkgroup in closed mode or ID hold mode, the user hears a pulsing effect on the audio because the scanner is muting and unmuting its audio at a rapid pace (3 - 4 Hz).

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Antennamania

Ramsey Antenna Kits

If you're a budding broadcaster, your antenna may not matter if you're only transmitting to your own backyard; but if you hope to reach a quarter mile or more on a low power FM license (assuming they become available), your antenna will be as important as a drift-free transmitter. Ramsey Electronics can provide not only the transmitter in kit form (see p.103 for a review of the FM-100), but they'll be happy to help you set up the antenna as well.

John Ramsey says, "matching your antenna to your transmitter is the single most important link in your transmitter set-up – and a



good antenna and match is the secret to getting maximum range. When we say match we mean electrical impedance match... if the proper impedances are not maintained between transmitter and antenna, power is reflected back away from the antenna and back into the trans-

mitter! This can cause the final amplifier stage to be damaged, not to mention a spurious signal and lousy range."

Top of the Ramsey line is the 5/8 wave FMA-200 broadcast antenna, covering 88-110 MHz with a maximum power of 200 watts. The 7-ft 7-in. collinear vertical antenna gives you 3.4 dBi gain over the entire FM broadcast band range of 88-110 MHz. Tuning over the band shows a VSWR of less than 1.5:1; the heavy duty matching coil and durable thick wall aluminum construction provides a maximum power rating of a whopping 200 watts. Input connection is through a standard PL-259 connector that is sealed inside the mast support pipe. The FMA-200 5/8 Wave FM Broadcast Antenna is \$114.95.

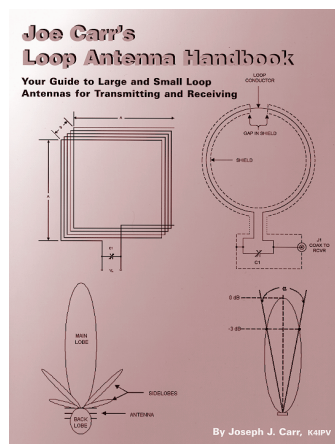
If that's too steep for you, Ramsey's Tru-Match 100 is a good quality FM broadcast antenna which will give you the most bang for your buck. The antenna kit consists of rugged pre-cut PVC pipe, antenna radiating elements and the proper matching assembly and is fully water-resistant when assembled. The antenna is easily mounted to any standard TV antenna mast. Standard connectors are provided. Total length of the antenna is about five feet, and it is easily mounted horizontally or vertically. Maximum input power is 25 watts. The Tru-Match FM Broadcast Antenna Kit is only \$39.95 and you can put it together in less than an evening! Ramsey Electronics, 793 Canning Parkway, Victor, NY 14564; Phone (716) 924-4560; or on the web at www.ramseyelectronics.com

Here we go loop-de-loop...

The loop antenna has always been of particular fascination to listeners. Not only is it compact, simple, and inexpensive, but highly directional, allowing interference to be nulled and directional bearings to be determined.

If you'd like to know more about loop antennas after reading the quadraform loop feature follow-on article in this issue, you'd do well to check out Joe Carr's latest antenna book. The *Loop Antenna Handbook* is copiously illustrated, and contains how-to projects for both receiving and transmitting. While concentrating on medium and short wave, there is even an excellent VHF loop project.

Charts and tables assist in the



design, while accompanying text, written in Joe's informal narrative style, explains many of the pitfalls and assembly details which might elude the casual experimenter.

The *Loop Antenna Handbook* by Joe Carr K4IPV is \$19.95 plus \$2 book rate shipping from Universal Radio, 6830 Americana Pkwy, Reynoldsburg, OH 43068-4113.

Antenna Science

Max Research has published two books for the experimenter,

operator, or hobbyist curious about the beauty and magic of radio waves. As their blurb for the book *The Science of Antennas* says, "Radio waves and antenna systems are the rudimentary elements of the monitoring and shortwave experience." Understanding what is known (and what is unknown) about how they function can add a new element to your experience of the airwaves.

The Science of Antennas and *Antenna System Optimization* interpret the theories of the early radio pioneers, such as Faraday, Maxwell, Sommerfeld, Schelkunoff, etc. See their ad in MT or write Max Research, PO Box 1306, East Northport, NY 11731 on how to order.

More Antenna Designs

Still thirsting for antenna topics? Three recently-updated books from the National Radio Club should give you fodder for construction and experimentation for years to come.

The *Loop Antenna Design and Theory* book is a compilation of numerous articles on the subject of design and theory of the loop antenna that have appeared through the years in *DX News*, the NRC newsletter. This book gives detailed information on the theory of operation, construction and maintenance of a loop antenna. It also serves as an enhancement to two basic antenna books also published by NRC: *Antenna Reference Manuals Volume 1 and 2*.

In the loop antenna book you can find multi-rod ferrite loop antennas, long wave converter detail, pattern controlled loops, loop antenna sensitivity, what's wrong with present day loop antennas, and much more.

Loop Antenna Design is \$12.95 (\$8.95 if a club member; NY residents add sales tax). To order or to enquire about other publications, write NRC Publications, PO Box 164, Mannsville, NY 13661.



The ATS-505: New from Sangean

As you read this, the shipments of a new Sangean portable radio should be underway to dealers. The ATS-505 is a continuous coverage dual conversion MW and SW digital receiver, tuning in 1 kHz steps, plus FM (stereo through the headphone jack).



The ATS-505, similar in appearance to the ATS-404, might be characterized as a “baby 909” – referring to the flagship ATS-909 portable.

The new portable has the features of the lower-cost ATS-404, and adds single side band (LSB and USB) reception.

Features include the auto preset system (setting memories based upon the signal strength of the station, and a “human wake system” of a repeating beep tone that increases in volume every 15 seconds for one minute.

There are 45 memories, the capability to do an auto memory scan of every memory preset (playing each for 7 seconds), an adjustable sleep timer, two alarm timers, a tone control, a dual time clock and a keyboard lock for traveling. Additionally, there is a switch set MW tuning to 9 or 10 kHz spacing. A carrying case and stereo “earbuds” are included.

The radio requires 6VDC. As the optional ADP-808 AC Adaptor is intended for use with the ATS-404, we see no reason why the ADP-808 should not work with the ATS-505. Check with your dealer to be sure.

The new ATS-505 has a suggested retail price of \$179; the street price is estimated to be around \$130, about \$30 more than the ATS-404.

– Tom Sundstrom

Hamming in Style

Taking a tip from the popularity of colorful pagers and FRS radios carried by the youngsters these days, Alinco has released a clear or “see-through” version of its black DJ-V5T VHF+UHF handheld ham transceiver, which retails for around \$229.

The timing of this stylish release is great for attracting the expected influx of young new amateur radio operators following the relaxing of code requirements. The clear plastic case – which appears slightly bluish – shows the placement of the circuit



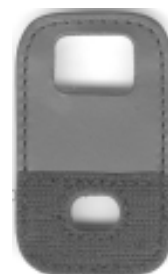
board, display, lighting, speaker, keypad, switches, etc.

MT will review this transceiver soon, but here are the primary features: 2-meter (144–148 MHz) and 70 cm (420–450 MHz) operation, alphanumeric display, up to 5 watts output, 200 memories, expanded receive capability (76–999.995 MHz, cellular blocked), narrow and wide FM receive modes, CTCSS encode and decode. Two models are available: the DJ-V5TDC powered by a transparent dry-cell battery pack, and the DJ-V5TDCH with a black NiCd battery pack.

See your favorite amateur radio dealer to try it for yourself, or watch for MT’s review!

The Radio Badge

Tiny shirt-pocket radios are everywhere: Family Radio Service radios and pagers, tiny 2-meter radios, frequency counters, and more have gotten so small they drop out of your



ACTIVE DUCK ANTENNA AMPLIFIES SHORTWAVE RECEPTION ON YOUR WIDEBAND SCANNER!

If you are the owner of a wideband, handheld scanner like the ICOM R1, R2, R10, AOR AR8000, 8200, 16, 16B, Yaesu VR500, or Alinco DJX10T, you know how difficult it is to hear shortwave or even medium wave broadcasters on the little antenna. Now you can enjoy considerably improved reception below 30 MHz with Grove’s exclusive “Active Duck,” a high performance, low profile, amplified antenna system.

Simply substitute the “Active Duck” for your original flex antenna, and listen to distant countries come booming in on your wideband handheld, and enjoy domestic AM broadcasters like you’ve never heard them before! VHF/UHF reception same as with original antenna. Battery included (Radio Shack # 23-279).

GROVE

Grove Enterprises, Inc.

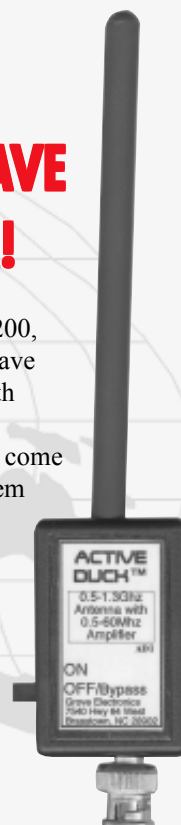
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pocket without being missed, or get yanked out when you get caught in



the earphone cord.

Cutting Edge Enterprises has an ingenious solution that keeps the radio near your ear without a wire and keeps your hands free: the Radio Badge. Wear your radio like a lapel microphone. Simply slide the mini-radio onto the 3"x 1-3/4" sturdy Radio Badge, and two strong pins hold your radio firmly to your clothing or even your hat! A piece of heavy-duty Velcro™ is enclosed in case you require added security.

The cut-out slot will accommodate belt clips up to 3/4" wide. The Radio Badge is \$19.95 from Cutting Edge Enterprises, 1803 Mission Street, Suite 546, Santa Cruz, CA 95060; 800-206-0115; cee@cruzio.com.

TV Station Guide

Just in time for E-skip season, the Worldwide TV-FMDX Association has published its first *TV Station Guide* in 20 years – and it's compiled by *MT* and WTFDA columnist Doug Smith!

The *Guide* is 185 loose-leaf pages listing every television station and translator in the United States, Mexico and Canada. The first section catalogs the stations numerically by channel (followed alphabetically by state); the second section is in channel map format.

The *2000 Guide* is \$23.95 (\$19.95 to members) payable to WTFDA, P.O. Box 501, Somersville, CT 06072; www.anarc.org/wtfda/

2000 M Street Radio Directory

The 9th annual *M Street Directory* is the industry publication most affordable for mediumwave DXers, but it has been steadily pricing itself out of the hobby market. The International Radio Club of America

(IRCA) can offer a discount on the *Directory* to DXers ordering through the IRCA Bookstore – \$40 postpaid instead of the \$72 retail price of the book elsewhere.

Is it worth it? Here's what you get: a complete listing of over 15,000 radio stations (AM/FM, US/Canada) including the following information: facilities, ownership, formats, LMAs, station personnel, phone numbers, addresses, ratings, as well as information on almost 400 radio markets in the US and Canada. Stations are listed by location (complete info), frequency (frequency, call, location, power and pattern), call (call, frequency, location) and market (frequency, call, location, rating, format). It also includes a former call reference (old call, location and current call). Major network information (addresses/phone numbers/etc) and several interesting radio articles are included as well.

For your copy, send your check for \$40 (payable to Phil Bytheway) to the IRCA Bookstore, 9705 Mary NW, Seattle WA 98117-2334. Outside North America add \$5.00 for surface, or for airmail add \$19.20 for Europe or \$27.25 for Australia/New Zealand.

Police Call 2000

It's hard to believe this annual scanner frequency directory, now edited by *MT* columnist Richard Barnett, gets better every year, but it does. The comprehensive listing of law enforcement, fire, emergency medical, press corps, rescue, railroads, highway crews, conservation agencies, hotel, sports and racing, schools, transportation, amusement parks, and more in the VHF and UHF scanner bands is considered the de facto standard for databases.

Cross referenced by state, agency name, service, and frequency, the exhaustive directory includes an enlarged introductory section to assist listeners as to choice of equipment, monitoring tips, what you will hear, and more.

Police Call is available in nine regional volumes. Order your state volume (including regional states) for \$12.95 plus \$4.25 priority mail from Grove Enterprises, PO Box 98, Brasstown, NC 28902. Also available as a comprehensive, 9-volume, nationwide CD-ROM for only \$34.99 (see March *What's New*).

Police Call, Southern California

Although concentrating on Southern California, *Police Call Radio Guide, Southern California Detail Edition* by Gene Hughes presents considerable nationwide information concerning the new FCC band plan, military and federal government frequency assignments, civilian aircraft channels, and more.

For pricing and shipping, contact California Radio Communications, PO Box 35102, Los Angeles, CA 90035.

Earth Rising

It's somewhat difficult to categorize a book like *Earth Rising - The Revolution: Toward a Thousand Years of Peace*. The 300-page soft-cover book by Dr. Nick Begich and James Roderick (authors of *Angels Don't Play This HAARP*) is at the very least thought-provoking. Using documentation from government, media, and academic sources, the authors put together a case for a modern dilemma: the same technology that can improve society and our life-styles can also be extremely dangerous to health, privacy, and (maybe especially) freedom.

Although some of the book examines mind control, chemical warfare, visual surveillance, etc., nearly half the book is on topics related to radio. For example, it examines what we're learning about the effects of electromagnetic waves on mental and physical health – in particular the effects of super low and extra low frequencies and microwave emissions.

The authors maintain the purpose of the book is to focus on solutions, but their primary answer seems to be to engender a skeptical or even suspicious attitude on the part of the reader toward anything put forward by a government or military agency. Virtually no space is devoted to positive uses of technology. The book does look at ethi-



cal questions, what defines us as human beings, and examines what kind of a future we may be headed for.

Written in the last days of 1999, it is certainly up to the minute. *Earth Rising* is available for \$17.95 from Earthpulse Press, Inc., PO Box 201393, Anchorage, Alaska 99520; Call 907-249-9111 or visit www.earthpulse.com.

What's the difference?

The primary difference between WinRADIO's WR1550 over the former WR1500 is its dynamic range. The dynamic range of the WinRadio WR1550 is approximately 71 dB: 6 dB better than the former WR1500. Dynamic range means the range of signal strengths (very weak to very strong) that the radio can handle without losing the weakest signal or getting interference from strong signals.

Catalogs

- The spring 2000 Skyvision catalog is available from 1010 N. Frontier Drive, Fergus Falls, MN 56537, or call 800-500-9275, or on the web at www.skyvision.com for C-band and DBS systems and accessories, tools, programming and great gadgets.
- For those hard-to-find parts to restore old radios, get Antique Electronic Supply's most recent flyer. Write AES at P.O. Box 27468, Tempe, AZ 85285-7468, or call 800-706-6789; or on the web at www.tubesandmore.com.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or e-mailed to mtditor@grove-ent.com.

The Ramsey FM-100 Stereo Transmitter

Review by Thomas James Arey

If you have been following the radio press for the last year or so, you are aware that there is a boom in interest in low power broadcasting. There is growing interest in the hobby community about the practical and fun uses of unlicensed Part-15 transmitters. (FM broadcast signal with a field strength not exceeding 250 microvolts/meter measured at a distance of three meters from the transmitter (*FCC rule 15.239*))

Others are testing the limits of the existing law (broadcast pirates) and still others have supported a total revamping of broadcast law to allow low power, affordable, licenses. The FCC's recent decision to allow low power broadcasting – consistent with its on-going move toward deregulation in all the radio services – make these very exciting times, indeed. (See this month's *Washington Whispers* and *American Bandscan* columns.)

The folks at Ramsey Electronics have long been at the forefront of low-power transmitter development. They were revolutionary even before most people knew a low power revolution was going on. Many low power experimenters began their hobby broadcast efforts by building one of two other Ramsey offerings, the FM-10 (now called the FM-10a) or the FM25.

While these transmitters continue to serve the needs of many hobbyists at very reasonable prices, a couple of years ago Ramsey answered the call for a more sophisticated FM transmitter to meet the needs of this growing aspect of the radio hobby. The no-compromise FM-100 provides studio quality audio signals and a level of transmitter control not found in other lower cost units, while remaining a legal Part-15 transmitter.

The FM-100 is more than just a transmitter; it contains all the essential aspects of a complete broadcast station short of the actual signal sources. The unit includes two line inputs and one microphone input, all with a high level of audio signal filtering and signal mixing controls. Further, the microphone line has Automatic Gain Control (AGC) to prevent overloading should you have the uncontrollable urge to start shouting like Wolfman Jack. Both channels also have LED readout audio level meters so you can see just what your signal is doing.

All of these efforts in design serve to allow the user to produce the highest quality signal free of the distortion and noise sometimes experienced by Part-15 listeners. Properly used, the audio quality of your signal should rival that of most any commercial station.

The 25 mW (that's milliwatt, not megawatt!) FM stereo transmitter is the response of Ramsey's years of technical experience to what their customer base wanted.

For places outside the United States where higher power is legal, this unit can be purchased with a 1 watt RF output module. Export units connected to gain antennas have been known to cover several miles with their signal. (But don't try this at home in the US, kids...The FCC still frowns on folks tweaking their equipment beyond Part-15 standards.)

Frequency control is state of the art, Phased Lock Loop-controlled. The output frequency is displayed on a large, easy to read, Light Emitting Diode (LED) display. Frequency adjustment is as simple as the push of a button.



Unlike many lower power transmitters that depend on "wall wart" or battery power supplies, the FM-100 has its own internal power supply. This supply benefits from filtering capacitors to reduce ripple, eliminating background audio hum. All your listeners should hear are your broadcasts.

The unit comes in a sturdy metal case with a silk screened front panel. This goes a long way toward making the whole package look very professional.

The whole kit and kaboodle

The FM-100 can be purchased in a fully wired and tested version; however, I opted to break out the soldering iron and build the kit. Over the years I have built many Ramsey kits. I have always been impressed with their attention to detail, particularly where beginners are concerned. While the FM-100 could be considered a moderately advanced kit, anyone who knows which end of a soldering iron to hold and who can follow clear, step-by-step directions should be able to build a fine project.

The Ramsey kit manuals rival the standards of the long departed Heathkit books. Complete parts inventory check lists are included along with check-as-you-go building steps. There is also a large-format parts placement guide that you can follow along as you do your work.

The Ramsey folks also take the time to teach you about the circuit as you go through the building process. By the time you are done, you will not only have an FM broadcast station, you will also have the ability to tell people how the thing works.

Recommended building time for a beginner is listed at 24 hours. This is about right. Since the construction is based on a series of circuit groups, it was easy to build a section or two through to completion in an evening.

Given the attention to detail of the manual, I had no reason to be surprised when the unit fired up the first time without any problems. Ramsey seems to have anticipated many of the common problems associated with construction projects and they tend to give a lot of extra support where it's needed.

Getting on the air

I have had previous experience with both the FM-10a and the FM-25. While these remain great entry level units, the FM-100 is clearly head and shoulders above either of Ramsey's previous offerings. I had to let my next door neighbor know that there wasn't a new station in town.

My most routine use for the FM-100 remains getting signals from my home stereo system out to a "boom box" by my backyard pool. The possibilities, however, go far beyond that. The FM-100 would make a great basic setup for a school radio program. The manual alludes to the fact that the unit can be used as a front end for "carrier-line" use but reminds people that they should seek a qualified engineer to make this happen.

Before you take to the airwaves, the Ramsey manual gives complete practical comments on the proper, legal use of this transmitter under the current regulations. This includes a list of Frequently Asked Questions that show they have been keeping their ears tuned to their customers over the years.

The world of hobby broadcasting is growing every day, but even with the newly-enacted low-power regulations the number of potential new licenses may not exceed 1,000. Why wait? Start broadcasting, legally and with the cleanest signals on the airwaves, using Ramsey's FM-100s.

The Ramsey Model FM-100
Professional FM Stereo Transmitter
\$249.95 Kit
Ramsey Electronics, Inc.
793 Canning Parkway
Victor, NY 14564
Phone (716) 924-4560
Fax (716) 924-4555
Web: www.ramseyelectronics.com

The Handheld Computer Market and GPS for Palm Pilots

We first spoke about handheld computing a few years ago, after I purchased a Windows CE machine on one of my trips to Hong Kong. To put it mildly ... I was NOT impressed.

Well, since in the technology world nothing remains the same, this time we'll review what the handheld computer market looks like in the year 2000. Has anything changed? You bet! But the direction handheld computing was to go was not intuitively obvious a few years ago. In fact, the most popular handheld "computer" is a PDA (personal data assistant) on steroids. DeLorme, the map people, even offer a GPS (Global Positioning Satellite) receiving system and mapping software for this powerful handful.

Recent Developments in Handheld Computers

Over the past two years the industry – and the majority of consumers – have failed to embrace the Windows CE handhelds made by various manufacturers, but all based on Microsoft's Windows CE operating system. The negative feedback from the market started once they realized that Windows CE had little-to-no operating relationship to Windows 3.1, 95 or 98. (I wonder where you first heard that opinion?)

Although graphically resembling real Windows, the similarities stop there, leaving users of both Windows and CE disappointed. But the bad news did not end there. The large amount of the CE machine's overhead (use of CPU and memory) consumed by the Windows-like graphics, resulted in a noticeable slowing down of the CE machines.

In short, the first generation Windows CE machines missed their marketing mark. Windows CE, Version 2.00, which utilizes a color LCD display, was then developed and released in 1999. The market reaction was not exactly overwhelming. In fact, Philips, who marketed the Nino line of CE handhelds, recently announced it is pulling out of the CE business.

Meanwhile, the need for mobile computers has grown rapidly over the past two years. Most of us realized we could find dozens of monitoring applications. As portable monitoring equipment gained ever-increasing power (witness the ICR-2 and the AR-8200), I found myself wishing for a small handheld computer for receiver control and data

storage. Other applications which could use a handheld "computer" were growing at a tremendous rate in many markets.

The Palm Pilot Takes Off

The 3Com company, which had purchased a company that was making a Sharp-Wizard-like "organizer," saw the market opportunity. Building on the organizer technology and form factor, 3Com turned it in to a handheld, smart display and control terminal. Palm 1000, which was little more than an organizer, evolved into the Palm III

at CES 2000, a portable fingerprint identification module for use with Palms.

Palm VII, introduced in mid-1999, includes a radio transceiver for wireless connection to the Internet and private networks. Although not quite yet a computer, with its elementary operating system, the Palm Pilot has been a tremendous success.

The Giant Opens An Eye

Microsoft watched the events in the handheld computer market unfold. Even the much-trumpeted introduction of CE version 2.00 could not stop the onslaught of Palm's market march. But now, rumors are circulating that Microsoft, with the major CE computer manufacturers, are developing a Palm-like, simplified operating system for introduction by late 2000. Let the games begin!

The Earth In Your Palm

DeLorme has been producing mapping software for as long as I can remember. Today they are a large company, headquartered at Yarmouth, near Freeport, Maine. They have a fascinating glass building which houses Eartha, the world's largest rotating and revolving globe. If you are in the area it is worth stopping to see Eartha and visit their map store.

Their first GPS product, Tripmate, was introduced in the early/mid '90s. It utilized their software, running on a Windows PC, to provide location information. Our impression back then was that it was a great ground-breaking product. The receiver's sensitivity seemed wanting, which led to variable results depending on location.

Well, DeLorme is now using Street Atlas USA, version 7.0. But now they offer the new and more sensitive Earthmate GPS receiver. And, with the use of a program called Solus Pro, the Earthmate can be connected to a Palm for control, decode and display.

"On Your Marks ..."

To get started you have to install Street Atlas and Solus Pro on the PC. I know: I said it was for the Palm. I was just as surprised. Another fact that you might find interesting is that the DeLorme software was written to run on *both* Palm and Win

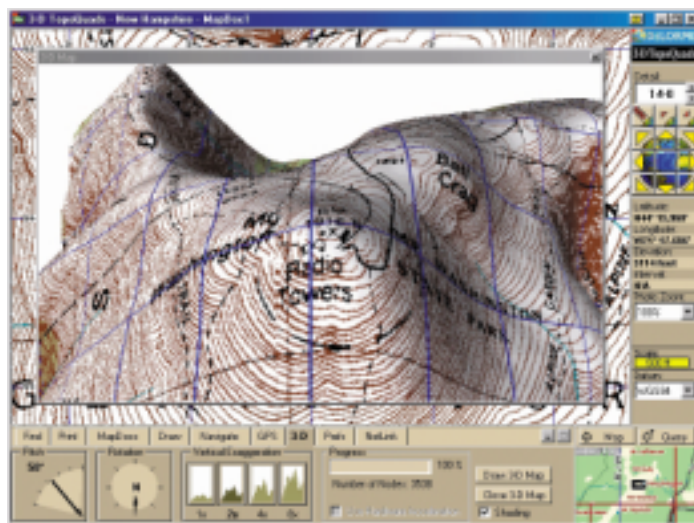


Fig. 1. 3D TopoQuads Projection of Mount Washington, NH

series of PDAs (see Jock Elliott's review last month).

Computer input/output ports were added. Palm IIIs were given a serial port and even infrared communications via an IrDA port. The liquid crystal display's usable resolution was increased until basic graphics could be displayed. The organizer/PDA was rapidly moving toward computer status when the operating system was made available to developers via the 3Com website.

The difference between Palm's operating system and Windows CE is that 3Com realized the limitations of the handheld and kept its operating system simple. (Did someone say KISS, keep it simple, stupid?) AOL, IBM and others have announced alliances and the development of products based on the Palm platform. Symbol Technologies have introduced a bar code reader for the Palms. Applied Biometrics Products Inc showed,

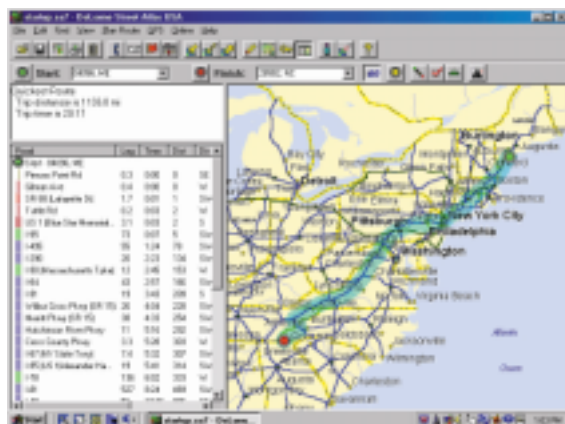


Fig. 2. Main Street Atlas Route & Map Screen

CE machines! This time we'll stick to the Palm application.

The installation of Street Atlas USA V7.0 and Solus Pro is quick and simple from the two supplied installation CDs. Street Atlas comes with two CDs. One is the install program and the other contains map data.

“... Get Set

You can use the program in a number of ways. I found the simplest was to enter the address of your starting location and your ending location. The program then does all the rest of the route planning.

Once a specific route of travel is defined, Street Atlas creates a route and a corresponding route file. A map of the route is also produced. See Figure 2 for the route and map between Brasstown, NC, and Yarmouth, ME (home of DeLorme). You can, and should, create maps at different magnification. This will enable you to follow your route more closely on the Palm display.

When these files are then downloaded to the Palm via the Hot Sync and Install Palm programs, the Earthmate is ready for Palm use.

My first Palm download attempts ended in disaster with the Palm freezing up. I called the very competent and friendly DeLorme Tech Support in order to work through the problem.

Although many problems are of my making, this one was not, as it turned out. Simply stated, if you use a version of Solus Pro prior to 1.5, it must be installed in your PC *before* you install Street Atlas. I had been sent Solus Pro 1.1. Unknowingly, I had loaded it after Street Atlas. With this new knowledge, I tried it in the correct sequence.

Once Solus Pro is installed, ignore all references to Solus Basic while installing Street Atlas. Solus Pro version 1.5 is not sensitive to the installation order.

“Go!”

Once the Earthmate is connected to the Palm via an optional cable attached to the bottom docking port, tap the Solus icon on the Palm to start. Tapping the fixed icon below the “House” on the lower left of the Palm displays two menu: Mode and Tools. Selecting “Tools” and then “Initialize” displays a screen where you can watch

the raw received satellite(s) data streams.

Since the receiver does not store a satellite constellation almanac, it can take a while to acquire the signals. The receive status symbol is at the top right hand corner of the display. If it is in the acquire mode it will display lines of radio waves.

Depending on how many satellites it can reliably “see,” the status indicator will display either 2D or 3D. The 3D mode gives all the longitude/latitude data, AND elevation.

How Well Does It Work?

Actually, very well. Attached to the Palm and placed near the windshield on the top of the dashboard of my car, Earthmate and its software performed flawlessly. I was able to keep track of my route turns via the moving Route list. The Palm even beeped when a scheduled turn was required.

The mapping was also well done. Even local landmarks, such as ponds, were displayed. For the optimal mapping display, the user should download a number of maps of varying magnification centered around each route change location. Without these detailed maps being loaded in the Palm, state maps are displayed which are almost useless due to their lack of detail.

If detailed maps are downloaded to the Palm, they can be used as you travel across your route.

You'll never have to stop to get directions again ... every man's dream.

The 3D capability, when used in conjunction with another DeLorme program, 3D TopoQuads, results in three dimensional location maps that I found mesmerizing as well as informative. See Figure 1.

Wish List

How about someone attaching a radio station or antenna tower database to the mapping function? Or an aircraft sectional chart overlay with local ATC and airport frequencies? That would be great for aircraft monitors on the road.

Where & How Much

The street price of the Palm IIIx is around \$167. The Palm VII is around \$399. Earthmate GPS's price is about \$159. Street Atlas USA version 7.0, with a basic version of Solus, is priced at \$45. 3-D TopoQuads is \$149 per state. These products are available at most computer retailers, on-line software stores and office superstores. DeLorme's website is www.delorme.com. 3Com's site is www.3com.com.

What will the handheld computer market have in store for us next time we visit? A real, full function, handheld computer? Not likely, until portable power source technology catches up with computing technology. But, watch this market closely. It may be a portal through which we can glimpse the future of computing and technology.



Timestep

If you own an ICOM PCR1000, all you need for Weather pictures is an antenna, a preamplifier and a TIMESTEP interface for your computer.

If you would like to see colored weather images as they move across the United States and Europe, call or email us. It is easier than you may think. With a dish looking out a South facing window, a Feed, an LNA, a Timestep Receiver and Timestep Interface, your computer and you are ready to receive these kinds of images.






U.S. GOES/IRFAX IMAGE
Dish in window
Timestep interface
European WEFAX image

We have all you will need for INMARSAT except the Receiver

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By Bob Grove,
Publisher

Low Power FM: Democracy on the Airwaves

Several years ago, I filed an application with the FCC for a license to operate an FM broadcast transmitter. The application was denied because I was a new applicant, and preference is given to existing licensees who want another...and yet another radio station. This concession to greed didn't set well with me, but my protests were ignored. Big business had won again.

But more recently, the FCC has taken a courageous stand against the broadcasting monopoly, creating a low power FM broadcasting service. Operating at 10 or 100 watts, with a range limit of a few square miles, these microbroadcasters would be allowed to operate on any assigned FM channel and would be licensed only to noncommercial organizations.

Beneficiaries to the new service would include schools, churches, civic organizations, charities, and other public and private institutions who would provide information, music, entertainment, local news, and other supportive programming of benefit to their communities.

Predictably, the National Association of Broadcasters adamantly opposes this unwelcome intrusion into their perceived exclusive domain. They fear that such nonprofit broadcasters would benefit from contributions and advertising revenue that the commercial broadcasters would have otherwise received.

The NAB exaggerates warnings of interference from and to LPFM by other licensed services, while overlooking the fact that such interference already exists among their own member stations which are becoming increasingly licensed. They report and endorse highly flawed estimates on potential interference to existing services ("...the independently owned, 'mom-and-pop' stations in the smaller markets that have fought to keep their heads above water and provide quality local programming"). How many of these teensy stations do they think there are in rural America?

For example, there are 100 channels available between 88.1 and 107.9 MHz, and coverage estimates for the new, low power service are on the order of a mile or two. Many LPFM broadcasters could easily operate simultaneously every few miles without causing co-channel or adjacent channel interference. After all, how many high-powered boomers are already there?

But the FCC only expects about 1000 licenses to be issued; let's see, with a ruler, a map, and a little math, that equates to one LPFM for every 3500 square miles. Not much interference potential there!

LPFM's detractors also imply that licensing will be done helter-skelter, allowing the low power licensees to place co-

channel transmitters on nearby full-powered channels, which is clearly nonsense.

Sadly, money talks, and the NAB's paid puppets in Congress are backing the monopoly's protests with hearings and House Bills. Billy Tauzin (R-LA) (*Ah, yes, we remember him well...*), Chairman of the House Subcommittee on Telecommunications, and recipient of \$10,500 from the NAB in the last election, has called to task FCC Chairman William Kennard for his proposed service.

We commend Mr. Kennard's courageous response to Mr. Tauzin's irresponsible sniping and unsubstantiated allegations regarding the FCC staff. While Tauzin tossed inflammatory accusations like "shakedown ... corruption ... blackmail" to the sensation-mongering press corps, Kennard, with infinitely more eloquence and restraint, responded to Tauzin and his cronies with a formal letter, observing: "...frankly, it is unfair, irresponsible and unworthy of a public official for you to cast aspersions on the integrity of the FCC in this manner without citing facts or examples of any such conduct." It will be interesting to see whether Tauzin has any substance, or simply enjoys abusing his entrusted appointment.

A Bill (HR3439) with the ironic title of "Radio Broadcasting Preservation Act of 1999" would forbid the implementation of the new service. HR3439 was introduced by another Subcommittee member, Michael Oxley (R-OH), recipient of \$2000 from the NAB last election. Ironically and apparently hypocritically, just last December Oxley led a successful movement to defeat an FCC proposal which would have limited the number of hours that educational licensees could devote to religious broadcasting.

To quote Oxley then: "(The FCC's proposal is) an unconstitutional restriction on religious speech." Now his own proposal denies licensing of religious as well as other charitable organizations who would benefit from this new service.

At this writing his misguided Bill has drawn support from 81 representatives who apparently want to stand alongside Oxley with their hands out for campaign contributions from the NAB cash cow. Perhaps my cynicism is jaded by my own personal experience with politicians on Capitol Hill. However, if they sincerely believe the information they've been fed, they need to hear some other voices.

Regardless of the outcome of this latest Washington debacle, the adamant and partisan opposition to such a democratic and benevolent ruling by the FCC to give a radio voice to the people is shameful. Contact your representatives now and find out their position on the FCC's LPFM ruling. It's an election year.

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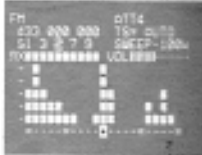
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